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STUDY OF HOUSEHOLDS' LOCATION DECISIONS

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The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is being conducted by the Metropolitan Transportation Commission, a nine-county regional agency established by state law in 1970.

The program is financed by the U. S. Department of Transportation, the U. S. Department of Housing and Urban Development, and the California Department of Transportation. Management of the federally funded portion of the program is vested in the U. S. Department of Transportation.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and lifestyles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. Finally, the findings will be interpreted with regard to their implications for the planning of transportation and urban development in the Bay Area and other metropolitan areas.

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BART IMPACT PROGRAM

LAND USE AND URBAN DEVELOPMENT PROJECT

STUDY OF HOUSEHOLDS' LOCATION DECISIONS

February 1978

WORKING PAPER

PREPARED FOR

U.S. DEPARTMENT OF TRANSPORTATION

AND

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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PREPARED BY JOHN BLAYNEY ASSOCIATES/DAVID M. DORNBUSCH & CO., INC., A JOINT VENTURE.

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16. Abstract

This working paper examines BART's effects on households' location decisions in San Francisco's Mission District, suburban Walnut Creek, and East Oakland. In each study area, randomly selected households that had moved in the 1975-76 period were interviewed by telephone to determine factors affecting moving and location decisions, the relative importance of BART in neighborhood choice, current and prior commuting patterns, workplace location, and socio-economic characteristics of respondents. Reasons for moving from one neighborhood to another are summarized, and BART's role in the decision-making process is described, with particular attention to the issue of who is influenced by BART. A multiple regression model explaining the importance of BART in residence choice in terms of workplace location, current and prior BART use, work trip length, occupation, age, income, ethnicity, and household composition also is presented. The paper closes with an assessment of the policy implications of this research.

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SAN FRANCISCO BAY REGION

CENTRAL AREA

Metropolitan Transportation Commission

BART: The Bay Area Rapid Transit System

Length: The 71-mile system includes 20 miles of subway, 24 miles on elevated structures and 27 miles at ground level. The subway sections are in San Francisco, Berkeley, downtown Oakland, the Berkeley Hills Tunnel and the Transbay Tube.

Stations: The 34 stations include 13 elevated, 14 subway and 7 at ground level. They are spaced at an average distance of 2.1 miles: stations in the downtowns are less than one-half mile apart while those in suburban areas are two to four miles apart. Parking lots at 23 stations have a total of 20,200 spaces. There is a fee (25 cents) at only one of the parking lots. BART and local agencies provide bus service to all stations.

Trains: Trains are from 3 to 10 cars long. Each car is 70 feet long and has 72 seats. Top speed in normal operations is 70 mph with an average speed of 36 mph including station stops. All trains stop at all stations on the route.

Automation: Trains are automatically controlled by the central computer at BART headquarters. A train operator on board each train can override automatic controls in an emergency.

Magnetically encoded tickets with values up to $20 are issued by vending machines. Automated fare gates at each station compute the appropriate fare and deduct it from the ticket value. At least one agent is present at each station to assist patrons.

Fares: Fares range from 25 cents to $1.45, depending upon trip length. Discount fares are available to the physically handicapped, children 12 and under, and persons 65 and over.

Service: BART serves the counties of Alameda, Contra Costa and San Francisco, which have a combined population of 2.4 million. The system was opened in five stages, from September, 1972, to September, 1974. The last section to open was the Transbay Tube linking Oakland and the East Bay with San Francisco and the West Bay.

Routes are identified by the terminal stations: Daly City in the West Bay, Richmond, Concord and Fremont in the East Bay. Trains operate from 6:00 a.m. to midnight on weekdays, every 12 minutes during the daytime on three routes: Concord-Daly City, Fremont-Daly City, Richmond-Fremont. This results in 6-minute train frequencies in San Francisco, downtown Oakland and the Fremont line where routes converge. In the evening, trains are dispatched every 20 minutes on only the Richmond-Fremont and Concord-Daly City routes. Service is provided on Saturdays from 9 a.m. to midnight at 15-minute intervals. Future service will include a Richmond-Daly City route and Sunday service. Trains will operate every six minutes on all routes during the peak periods of travel.

Patronage: Approximately 142,000 one-way trips are made each day. Approximately 200,000 daily one-way trips are anticipated under full service conditions.

Cost: BART construction and equipment cost $1.6 billion, financed primarily from local funds: $942 million from bonds being repaid by the property and sales taxes in three counties, $176 million from toll revenues of transbay bridges, $315 million from federal grants and $186 million from interest earnings and other sources.

March 1978

PREFACE

The BART Impact Program (BIP) is a comprehensive policy-oriented effort to identify, describe, measure, and present findings as accurately as possible about the multi-faceted impacts of a major public transportation investment — the BART system. The major objective of the Land Use and Urban Development Project is to determine how and to what extent BART has influenced the spatial arrangements of people and activities within the San Francisco Bay Area. To accomplish this task, the project will focus on the way BART has influenced (1) location decision processes; (2) actual movement behavior that results from those decisions and other market forces; and (3) the form, character, and functioning of aggregate spatial groupings that represent the net outcome of those decisions and movement patterns. Changes attributable to BART will be measured against pre-BART and no-BART alternatives. In all of these studies, BART's effects on individual socio-economic groups, particularly minorities and the disadvantaged, will receive careful attention.

The Land Use and Urban Development Project is one of six major projects comprising the BART Impact Program. The others are:

- Economics and Finance Project (E&F)
- Environment Project (Env)
- Institutions and Lifestyle Project (ILS)
- Public Policy Project (PP)
- Transportation System and Travel Behavior Project (TSTB)

Each of these projects is designed to investigate specific aspects of BART's impacts, to explain why the impacts occur, and to identify who is affected by the impacts and the distributional effects. The projects then will demonstrate how the information derived can be used by decision-makers to enhance the benefits and to reduce the dis-benefits of BART, and to increase understanding of the potential impacts of rail rapid transit investments in the Bay Area and other American metropolitan areas.

This working paper presents the analysis and findings of the study of BART's impact on households' location decisions — one aspect of BART's impacts on land use and urban development. The paper is presented for review by BART Impact Program staff, federal sponsors, and other interested planners and researchers.

TABLE OF CONTENTS

	Page
SUMMARY	1
1. INTRODUCTION	4
2. RESEARCH QUESTIONS AND STUDY DESIGN	5
Theoretical Perspective	5
Research Hypotheses	6
The Household Survey	6
3. FACTORS AFFECTING HOUSEHOLDS' LOCATION DECISIONS	19
Reasons for Leaving a Neighborhood	19
Reasons for Choosing a Residence Location	22
Relative Importance of Factors Affecting Residential Location Decisions	24
4. BART'S ROLE IN THE DECISION-MAKING PROCESS	26
Impacts on Moving Decisions	26
Impacts on Location Decisions	33
Who is Influenced by BART?	42
5. A GENERAL MODEL	47
Specification of the Model	49
Conclusions	53
6. CONCLUSIONS AND IMPLICATIONS	57
Policy Implications	58
BIBLIOGRAPHY	60
PARTICIPATING FIRMS	62
APPENDIX A: Questionnaire for Study of Households' Location Decisions	A-1
APPENDIX B: Detailed Results of Regression Analysis	B-1

Table 16. Households With a Job Location Change to a BART Service Area Prior to a Residence Change Compared to Usual Commute Mode 30

Table 17. Importance of BART in Residence Choice Among East Oakland Movers 31

Table 18. Socio-Economic Differences Between Middle Income Households and Low Income Households Moving From East Oakland 32

Table 19. Differences Between East Oakland Movers in Terms of Income, Ethnicity, and BART's Importance in Location Decisions, by Prior Residence Location 34

Table 20. Relationship Between the Importance of BART in Residence Choice and the Use of BART in Commuting, by Mover Sample 35

Table 21. Relationship Between BART's Importance in Residence Choice and BART's Accessibility Impacts 37

Table 22. Relationship Between Residential Location and the Importance of BART in Residence Choice 38

Table 23. Relationship Between BART's Importance in Location Decisions and Commute Times 39

Table 24. Relationship Between Residential Location, Commute Mode, and Willingness to Pay a Premium to Live Near BART 41

Table 25. Relationship Between Socio-Economic Characteristics and the Importance of BART in Residence Choice 43

Table 26. Importance of BART in Residence Choice by Tenure and Household Composition of Respondents 44

Table 27. Relationship Between Prior Residence and Current Workplace and Importance of BART in Residence Choice 45

Table 28. Model Specifications (Coefficients and Statistics) — All Movers 51

Table 29. Model Specifications (Coefficients and Statistics) — Walnut Creek Movers 52

Table 30. Predicted Values on the Importance of BART Proximity in Residence Choice for Assumed Typical Respondents in Each Study Area 55

FIGURES

Figure 1. Study Areas 7

TABLES

Table 1. Importance of BART in Residential Location Decisions 9

Table 2. Characteristics of East Oakland Subareas, 1970 9

Table 3. Relationship Between Research Hypotheses and Relevant Variables for the Study of Households' Locational Decisions 10

Table 4. Results of Telephone Interviewing 11

Table 5. Comparison of Socio-Economic Characteristics of Moving Households Surveyed with Residents Surveyed in the 1973-1974 BART Impact Travel Survey 13

Table 6. Comparison of the Socio-Economic Characteristics of Moving Households Using BART with the 1976 BART Passenger Profile 14

Table 7. Principal Mode of Travel to Work 15

Table 8. Relationship Between Present Commute Time and Mode of Travel, Mission District and Walnut Creek Movers 16

Table 9. Relationship Between Minority Status and Socio-Economic Characteristics 17

Table 10. Distribution of Reasons for Moving From Old Neighborhood 20

Table 11. Distribution of Reasons for Moving into a Neighborhood 21

Table 12. Neighborhood Services and the Wish to Move: Statistics from the San Francisco-Oakland National Housing Survey 1975 23

Table 13. Relative Importance of Factors Affecting Location Decisions 25

Table 14. Relationship Between a Household Workplace in a BART Service Area and the Importance of BART in Residence Choice 28

Table 15. Households With a Job Location Change to a BART Service Area Prior to a Residence Change Compared to the Importance of BART in Residence Choice 29

SUMMARY

OBJECTIVES

The objectives of the study of households' location decisions, Work Element 3 of the Land Use and Urban Development Project, were (1) to determine BART's relative effect on the choice of residential location; (2) to relate that impact to other determinants of residential location; and (3) to see whether BART has had measurably different effects on minority and non-minority households' decisions. BART's effects on the migration of middle income households to suburban and outlying areas also was examined.

This work element was structured to complement the parallel studies of workers' location decisions (Work Element 4) and the housing industry (Work Element 5), building on the accessibility mapping effort (Work Element 2). The results of this survey will be used in analyzing and interpreting BART's effects on development patterns (Work Element 7) and in the program-wide case studies (Work Element 16).

METHODOLOGY

Eight research hypotheses were formulated, using journey to work theories of residential location and prior expectations about BART's impact. Then a survey of households moving into San Francisco's Mission District and suburban Walnut Creek and out of East Oakland since 1975 was conducted. All told, 315 telephone interviews were completed, covering moving and residential location decisions, the relative importance of BART accessibility and proximity to BART, and other criteria governing neighborhood choice, current and prior commuting patterns, job location, and socio-economic characteristics of respondents. The survey data then were analyzed statistically to test the research hypotheses. Early in the study two of the original eight hypotheses were found untestable; the findings summarized in the following section address the remaining six hypotheses.

FINDINGS

BART has influenced the residence location decisions of long distance commuters: Walnut Creek residents working in downtown San Francisco and, to a lesser extent, downtown Oakland, but has had little effect on the decisions of households moving into the Mission District and moving out of East Oakland. More specifically, the Work Element 3 survey provided evidence supporting the following findings:

- BART has had virtually no influence on the initial decision to move, and proximity to BART rarely was the determinant of neighborhood choice. Relative to other factors, BART's influence on location decisions was quite small and mainly affected those working in a BART service area.

- Only among Mission District movers, who primarily were lower income, unmarried renters, did a change in job location prior to a change in residence location increase BART's importance in neighborhood choice. Even though such a sequence of moves may have increased an individual's awareness of transportation and commuting options, the likelihood of using BART was unaffected.

- BART has not stimulated moves out of older urban areas in the sense that such moves were made because of BART accessibility at other locations. Housing needs and, to a lesser extent, inadequate neighborhood services cause such moves. However, in the location decisions of middle income movers leaving such areas, BART is a more important factor than in those of lower income households. At these income levels there were no discernible differences between minority and non-minority respondents.

- Most BART riders surveyed (86 percent) took proximity to a BART station into account in residential location decisions, but more importantly 43 percent of the commuters who now drive or take the bus to work also considered BART in choosing a new neighborhood in which to live. For these households BART represents a means of keeping their transportation options open and protecting their investment in a home should congestion reach intolerable levels or gasoline shortages limit automobile use.

- Walnut Creek movers valued access to BART more often than Mission District movers primarily because of the service it has provided to downtown San Francisco, Oakland, and other major employment centers. Most Mission District workers find Muni more convenient. Those living within 10 minutes driving time were influenced as frequently, proportionally, as those within the same walking time, suggesting that close geographic proximity is a relatively unimportant factor in explaining BART's impacts on location decisions.

- Those who considered BART important in residence choice also were willing to pay a premium to live near BART, and location relative to the station itself — within or beyond walking distance — had no significant effect on response rates.

Those influenced by BART tended to be older, better educated, and higher paid than respondents indifferent to BART as a factor in neighborhood choice. Owners were more interested in BART than renters, possibly reflecting a longer term perspective. For them BART represents a means of protecting their investment should congestion reach intolerable levels or gasoline shortages limit automobile use.

In the communities surveyed, the demand for housing within walking distance of BART appears weak, but respondents may have been unable to visualize a desirable residential environment near the BART stations they know.

POLICY IMPLICATIONS

A better understanding of how BART, and possibly rail transit anywhere, affects residential location decisions can aid in formulating land use and urban development policy. The findings of this survey correlated with the findings of other work elements, notably the studies of workers' location decisions, office construction, and the housing industry, suggest the following policy implications.

First, because BART has virtually no impact on mobility rates (the initial move decision), in the three areas surveyed, population growth (or decline) in the central cities and older urban areas may be unaffected unless job locations also are affected. Changes in housing needs cause most people to move, and the journey to work remains a critical determinant of residential location along with local market conditions, public services, and neighborhood amenities. Consequently, housing opportunities in such areas are likely to be affected only to the extent that BART affects locational decisions, and draws people to the suburbs who otherwise might have considered an urban location.

Second, BART may have some effect on corridor growth rates and development patterns, but will not under current conditions provide sufficient impetus for clustering of much high density housing around suburban automobile-oriented stations. Some households are attracted to or would pay a premium for a station area location, and over the long-run a market for housing close to BART may exist. Careful planning and marketing will be required to make expectations become reality. If communities want to encourage station area development, they should provide for a mix of housing within walking distance, catering to couples and families as well as single persons. Housing options should include townhouses and condominium apartments for purchase by various household types.

Third, to the extent that BART plays a role in the centralization of office space, or at least delays decentralization, it will affect the housing markets in the suburban communities it serves, transferring a certain amount of development pressure from areas not directly served. However, the overall rate of suburbanization will not be affected because BART is a relatively unimportant factor in moving and location decisions.

Four, BART and those planning for other (proposed) rail transit systems should consider the possibility of hedging in their marketing plans and service improvement programs. Households who use the bus or auto may move to a location near BART to keep their transportation options open. For them minor service improvements, satellite parking lots and good feeder bus service may be sufficient incentives to begin to ride BART. Analysis of the access needs of this subgroup should be considered a priority item in long-range planning for increased BART use. Likewise local governments should consider this impact in formulating station area land use plans.

1. INTRODUCTION

Major transportation improvements will influence decisions on where to live and work if they significantly affect commuting times and costs. Over time, this impact on location decisions will be reflected in land use and development patterns. The issue to be addressed in this paper is whether and to what extent BART, the first regional rapid transit system to be built in the U.S. in 50 years, has affected residential location decisions. Are long-distance commuters, the primary beneficiaries of the system, taking BART into account in deciding where to live? Within the inner cities, are the transit-dependent at all influenced by BART in their location decisions? The answers to these questions will provide a basis for gauging BART's urban form-giving potential.

The specific objectives of the Study of Households' Location Decisions, Work Element 3 of the Land Use and Urban Development (LU&UD) Project, were (1) to determine BART's relative effect on the choice of residential location; (2) to relate that impact to other determinants of residential location; and (3) to gauge whether BART has had measurably different effects on minority households' decisions in contrast to location decisions of other socio-economic groups. BART's effect on the migration of middle income families to suburban areas also was investigated. Households who recently moved into San Francisco's Mission District, into Walnut Creek, or out of East Oakland, selected at random and interviewed by telephone, provided the information upon which the findings and conclusions presented in this paper are based.

A closely related survey of people working in downtown San Francisco and Oakland, conducted in Work Element 4 of the LU&UD Project, addressed BART's effects on workers' location decisions. Because workplace and residential location decisions often are linked, this survey also included questions on households' residence location decisions.[1]

The research questions and study design are described in Chapter 2, and the findings are summarized in Chapters 3-5. First, factors affecting location decisions are delineated, then BART's impacts on the decision-making process are described. The final chapter presents conclusions and implications of this survey effort. The questionnaire is contained in the Appendix.

1. John Blayney Associates/David M. Dornbusch and Company, Inc., Study of Workers' Location Decisions, (Berkeley: BART Impact Program Land Use and Urban Development Project Working Paper, November 1977).

2. RESEARCH QUESTIONS AND STUDY DESIGN

THEORETICAL PERSPECTIVE

Much theoretical and empirical research has been done on residential location decision-making (see Bibliography). The basic model, formulated by Alonso, Kain, Brown, and others, posits a tradeoff between journey to work costs and housing costs.[2] Some workers prefer to live close to their place of employment to reduce travel time and costs, while others opt for housing in a suburban environment, with reduced housing costs or greater amenity, but typically with longer commuting times and increased commuting costs to reach their place of employment.

However, not all urban economists regard the journey to work as fundamental in explaining residential location decisions. Stegman, for example, found that in a national survey of households, reasons given for choosing a particular residence rarely were related to the journey to work.[3] If these theories more accurately describe an individual's calculus, then rapid transit is less likely to affect residential location decisions.

In examining moving behavior, it is important to distinguish the move decision from the location decision. The relationship between workplace and residential location decisions also has to be taken into account. Of relevance here is Brown's work analyzing the 1965 Bay Area Transportation Study Commission (BATSC) household survey. He concluded that "households with job changes are more likely to move, that households with job moves outside their original work zone have the highest moving rates, and that the likelihood that a household will move is greater if the new workplace requires an increase in the work trip."[4] He further found that life cycle and income changes influence moving decisions, an effect that differs between house owner and renter households. However, he did not specifically examine the role of a transportation improvement in initial move decisions or location decisions.

Brown's research is important for two reasons. First, it reaffirms the relevance of the journey to work in residential location decisions. More importantly, though, it points out the need to consider the move and location decisions from a dynamic perspective, taking account of the effect of changes in family size

2. W. Alonso, Location and Land Use, (Cambridge: Harvard University Press, 1964); J. Kain, Essays on Urban Spatial Structure, (Cambridge: Ballinger University Press, 1975); H.J. Brown, "Changes in Workplace and Residential Location," (Journal of the American Institute of Planners, January 1975).
3. M. A. Stegman, "Accessibility Models and Residential Location," (Journal of the American Institute of Planners, January 1969).
4. H. James Brown, "Changes in Workplace and Residential Location," (Journal of the American Institute of Planners, January 1975).

and composition, income, or workplace location. Such factors may be important in explaining BART's influence because whenever such changes occur, an individual is more apt to reevaluate transportation options when considering alternative residential locations than if these factors had remained constant.

RESEARCH HYPOTHESES

Six research hypotheses about BART's impacts on households' location decisions were formulated for testing in Work Element 3:

1. BART affects selection of a new residential location only after a basic move decision is made, and mainly influences the decisions of those working in a BART service area.

2. A change in job location to a BART service area prior to a change in residence location increases the influence of BART on the location decision and the likelihood of BART use for work trips, shopping trips, and other trips.

3. BART has stimulated moves out of older urban areas by middle income white households and by middle income minority group members.

4. Households tend to move where BART provides improved accessibility to their workplace.

5. BART has a greater influence on moves to suburban locations than to urban locations.

6. Households moving into a BART service area are willing to pay more for housing than in a similar neighborhood without BART service.

The Study Design also included two hypotheses that subsequently were dropped for technical reasons. One called for studying the effects of BART on property and sales taxes. This issue was judged less important than the other questions, and further would have required diluting the East Oakland sample with movers now living outside the BART District. The second hypothesis suggested that the timing of moves was correlated both with BART planning and publicity and the beginning of service. Questions directed toward measuring this hypothesis would require respondents to recall advertising to which they have been exposed three years ago, and to recall the actions they believe were attributable to that advertising. Because such advertising impacts were judged to be the least important of possible BART influences and information obtained from such questions might be suspect, this hypothesis was dropped when the interview questionnaire length had to be limited.

THE HOUSEHOLD SURVEY

To test these hypotheses a survey of households moving into Walnut Creek and the Mission District and households moving out of East Oakland was conducted. In all three study areas a random sample of households that had moved in the

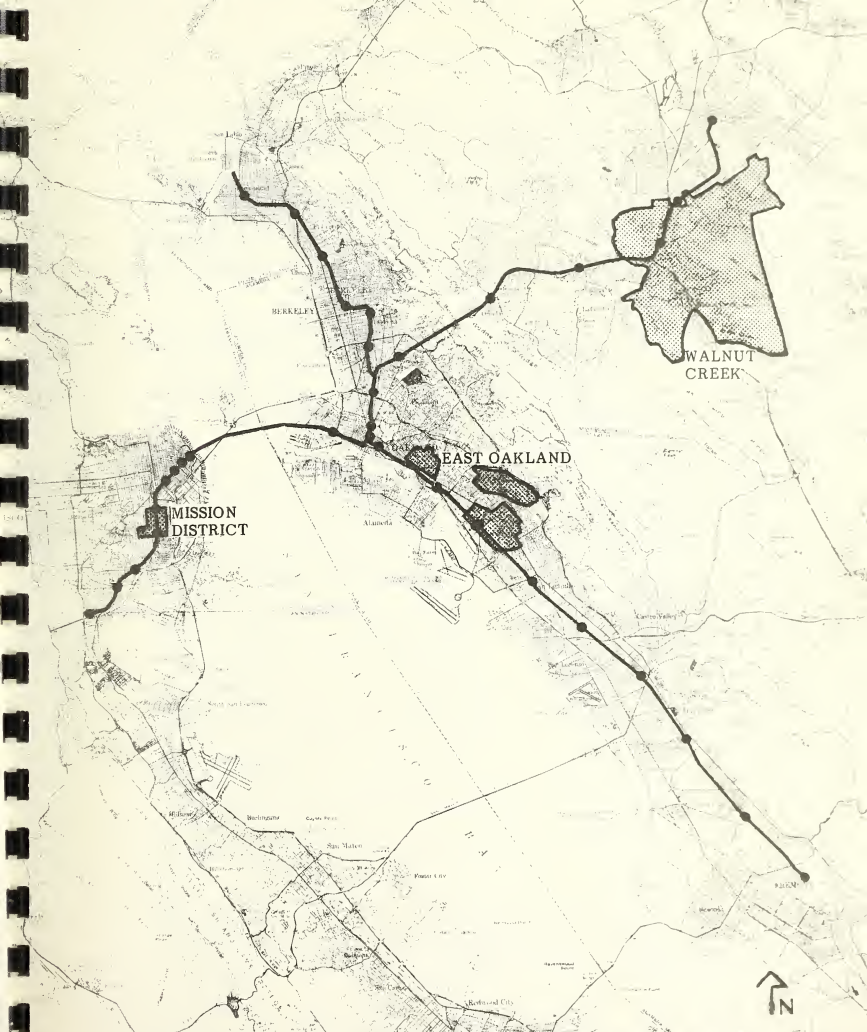

FIGURE 1.
STUDY AREAS

1975-76 time period was selected and then interviewed by telephone. The three study areas are shown on a map on the preceding page. The principal characteristics of each area are summarized in the following paragraphs.

San Francisco's Mission District is a densely populated, mixed commercial and residential area containing a high proportion of pre-1940 housing. More than half of the 107,200 residents living within one mile of two Mission Street BART stations are minorities (Latinos, Asians, and blacks) whose proportion reportedly has been increasing since 1970. According to the 1973-74 BART Impact Travel Survey, just under 11 percent of movers to the Mission District considered BART an important factor in their location decisions (see Table 1).

By contrast, Walnut Creek is a growing suburban community with a nearly all white population of above median income. In 1975, close to 70,000 persons lived in the study area, most no more than a 6-minute drive from the BART station. Both the Mission District and Walnut Creek were selected as program-wide case study areas, so the findings of the survey can be correlated with other studies of BART's impact in order to arrive at a comprehensive picture of how BART has affected each community.

East Oakland was selected primarily to test the hypothesis about BART's impacts on moving decisions in a racially-changing neighborhood and its effect on "white flight". Within East Oakland three subareas were identified (the Hill, Flats, and the Fruitvale District) in order to provide a basis of comparison between predominantly black and mixed neighborhoods. Comparative statistics are summarized in Table 2. The Oakland Hills are populated by moderate and higher income whites, while the Flats and Fruitvale are typified by a greater black population (46-78 percent in 1970) with lower median incomes.

A questionnaire was formulated to obtain information on the role of transportation (and of BART in particular) in households' choices of where to live, in-depth information on the decision to move, the choice of a workplace by each employed member, the previous residence location, current BART use for various trip purposes, and socio-economic information on households (particularly changes in income, family size, number employed, and composition). Appendix A contains the complete questionnaire. Each survey question applied directly to the testing of one or more of the Work Element 3 hypotheses (see Table 3).

The Work Element 3 sample was composed of adults in randomly-selected households identified by comparing 1975 with 1976 reverse telephone directories. First, streets in each study area were listed in alphabetical order; then the directories were compared to obtain a list of potential "in-migrants" or "out-migrants". To avoid a bias due to the configuration of streets, respondents were selected from both high and low numbered ends of the street.

This sampling procedure yielded 615 movers into the Mission District, 593 into Walnut Creek, and 340 out of East Oakland. The telephone interviewing was conducted between October 21, 1977 and November 11, 1977. A total of 315 interviews were completed; 107—Mission District, 173—Walnut Creek, and 35—East Oakland.

TABLE 1. IMPORTANCE OF BART IN RESIDENTIAL LOCATION DECISIONS (1973-74 BART Impact Travel Survey)

	Considered Access to BART in Choosing a Place to Live		Response to Question
	Yes	No	
Walnut Creek	26.8%	73.2%	168
- Important Consideration	18.8%		
- Minor Consideration	8.0%		
Mission District	13.0%	87.0%	185
- Important Consideration	10.8%		
- Minor Consideration	2.2%		

Source: Metropolitan Transportation Commission, Survey Research Center

TABLE 2. CHARACTERISTICS OF EAST OAKLAND SUBAREAS, 1970

	Hills[1]	Flats[2]	Fruitvale[3]
Population	16,250	25,580	18,860
Median Income (1969 Dollars)	$11,500	$7,200	$7,300
Percent Black	18.0	77.8	45.6
Percent High School Graduates	62.4	39.6	45.1
Estimated Annual Moving Rate (Percent)[4]	10.0	11.1	11.1

1. Census tracts 4077, 4078, 4082, and 4083.
2. Census tracts 4085, 4088, 4089, 4094, 4095, and 4096.
3. Census tracts 4074, 4075, and 4076.
4. Calculated from number indicating same residence 1965 and 1970.

Source: 1970 Census

TABLE 3. RELATIONSHIP BETWEEN RESEARCH HYPOTHESES AND RELEVANT VARIABLES FOR THE STUDY OF HOUSEHOLDS' LOCATIONAL DECISIONS

Illustrative Survey Variables (Numbers refer to Questionnaire)	Households tend to move where BART provides improved accessibility to their workplace.	BART affects residential location decisions only when it influences decisions to change BART service areas.	A change in job location to a BART service area prior to a change in residence location increases the influence of BART on the location decision.	BART has a greater influence on moves to suburban locations than to urban locations.	BART has stimulated moves from urban areas made by middle income white and minority households.	Households moving into a BART service area are willing to pay more for housing than into a similar neighborhood without BART service.
Factors influencing residential location decisions (5)	●	●			●	
Importance of location (4-6)	●				●	●
Importance of access to work (4,5,8)	●		●			●
Importance of access to public transportation and BART (7, 9, 10, 11)					●	●
Changes in work trip travel time: Old residence versus new (18, 28)	●		●			●
Reasons for timing of move (4)		●			●	
Willingness to pay a premium to live near BART (11)						●
BART use (17,29,30)	●		●			

TABLE 4. RESULTS OF TELEPHONE INTERVIEWING

	Mission District Sample	Walnut Creek Sample	East Oakland Sample
Initial Number of Potential Respondents Identified	615	593	340
Did Not Meet Sample Requirements	376	185	175
- Had not moved within past three years	47	29	79
- Listed household not at this number	221	50	41
- Listed household moved again (telephone disconnected)	108	106	55
Sample of Moving Households	239	408	165
Completed Interviews: Number	107	173	35
Percent	45%	42%	21%

Source: Tyler Research Associates

The results of the telephone interviewing, summarized in Table 4, show that the highest completion rates were in the Mission District and in Walnut Creek. There are many reasons for failure to complete interviews, such as outright refusals, unavailability of the head of household after repeated calls, language barrier (not Spanish, several interviews were conducted in Spanish), etc. The lower response rate in East Oakland is attributed to the fact that respondents tended to be less educated and more fearful of telephone contacts which they viewed as potentially intimidating or threatening. Among those not meeting the sample requirements, 155 or 10 percent of the initial number of respondents had not moved within the past three years although their telephone listing had changed. Another 581 (37.5 percent) either had moved again or were not using the listed telephone number. Households living outside the Mission District or Walnut Creek would contribute little to a study of BART's impacts on residential location decisions within the study areas. Similarly among the initial East Oakland sample households which had moved again after leaving East Oakland were excluded from the study because they were not comparable, and BART's effects on the decision-making process could not be easily isolated and related to the initial move decision.

Profiles of Movers Surveyed

In the Mission District the typical mover surveyed was under 35 years of age, a trade school or college graduate, and for the most part employed in a white collar occupation. In fact, 31 percent were professionals, 16 percent service workers, 14 percent clerical workers, and the balance distributed among the other occupations. Minorities represented in the sample include persons of Spanish heritage (12 percent), Asians (12 percent), and blacks (2 percent). Close to 31 percent were married; average number employed was 1.6 persons per household; and median household income (1976) was $9,900.

The Walnut Creek sample was somewhat older, more highly educated, predominantly white, and most of the household heads (60 percent) worked in the highest status occupational category -- professional-technical, proprietors, managers, and officials. Less than 5 percent of the Walnut Creek movers were in any of the minority groups (4 percent were Asian), a finding consistent with the 1975 Special Census which reported 96 percent of Walnut Creek residents as white. Most households moving into Walnut Creek were married couples with children (79 percent); average number employed was 1.6 persons per household. This sample also included a high proportion of upper income households; median 1976 income was $26,900.

The East Oakland movers included the greatest proportion of younger, less educated minorities working in blue collar or clerical occupations. Nearly 11 percent were unemployed versus 5.6 percent of the Mission District respondents and 5.8 percent of the Walnut Creek respondents. While a majority of East Oakland residents are black (51 percent, according to the 1970 Census), 35 percent of survey respondents were black and 60 percent were white. In contrast to the Mission group, almost 70 percent of the households were composed of married couples, and the average number employed was 1.6 persons per household. The median income for East Oakland movers was $14,700 in 1976.

Table 5 shows the socio-economic characteristics of the survey of movers in Work Element 3 in relation to the characteristics of the households sampled in the 1973-74 BART Impact Travel Survey (BITS). It should not be inferred that the composition of the areas surveyed has changed significantly since the BITS Survey, but rather, the differences probably should be attributed partially to sampling technique (see Sampling Implications section) and partially to differences between the characteristics of movers and the population at large.

Table 6 compares the socio-economic characteristics of Work Element 3 movers who were BART patrons with the BART riders surveyed in the 1976 BART Passenger Profile Survey. The relatively small number of BART users in the Work Element 3 survey does not allow a disaggregated comparison for each study area; however, overall BART patrons in the household survey were generally somewhat older, had similar educational attainment levels, had higher incomes, and were more likely to be white than the BART Passenger Profile taken from a sample of riders throughout the system.

TABLE 5. COMPARISON OF SOCIO-ECONOMIC CHARACTERISTICS OF MOVING HOUSEHOLDS SURVEYED WITH RESIDENTS SURVEYED IN THE 1973-1974 BART IMPACT TRAVEL SURVEY

(Percent Distribution)

	MISSION DISTRICT		WALNUT CREEK		EAST OAKLAND	
	Movers Survey (1977)	Residents Survey (1974)	Movers Survey (1977)	Residents Survey (1973)	Movers Survey (1977)	Residents Survey (1973)
AGE						
Under 25	14.9	18.1	9.3	11.7	2.9	15.5
25 to 34	55.1	33.6	32.4	20.0	54.3	25.1
35 to 44	16.8	15.2	28.4	25.8	28.6	13.2
Over 44	12.2	33.1	28.3	42.2	14.4	46.3
	100.0	100.0	100.0	100.0	100.0	100.0
EDUCATION						
Less than H.S. Graduate	5.6	28.3	1.2	9.1	11.4	27.4
High School Graduate	13.1	26.4	13.3	25.6	28.6	35.7
Trade School or 1-3 Yrs. College	32.7	22.0	27.1	26.2	28.6	22.5
College Graduate or Higher	46.7	22.9	56.6	38.4	28.6	13.7
Refused ED	1.9	0.5	1.7	0.7	2.8	0.8
	100.0	100.0	100.0	100.0	100.0	100.0
OCCUPATION						
Professional, Technical	32.7	17.6	36.8	28.0	19.3	12.0
Proprietors, Managers, Officials	8.0	3.4	26.9	37.0	9.7	15.7
Sales Workers	6.9	--	15.4	7.1	3.3	6.0
Clerical	14.9	13.5	5.5	1.9	12.9	7.7
Craftsmen, Foremen	8.9	19.3	6.8	14.1	22.6	19.7
Operatives	5.9	14.5	1.8	2.4	12.9	16.3
Service Workers	16.9	15.2	4.2	7.6	6.4	11.3
Laborers	1.0	8.8	0.6	1.4	6.4	8.7
Private Household Help	--	7.1	--	--	--	--
Military	1.0	--	0.6	--	--	1.7
Other	3.9	0.7	1.3	0.5	6.4	0.7
Total Employed	100.0	100.0	100.0	100.0	100.0	100.0
ETHNICITY						
White	73.8	60.2	94.8	96.5	60.0	60.7
Spanish American/Spanish Heritage	12.1	23.8	0.6	1.9	5.7	7.2
Black	1.9	6.0	0.6	0.5	34.3	26.1
Asian	12.1	8.3	4.0	1.0	--	4.4
American Indian	--	0.5	--	--	--	--
	100.0	100.0	100.0	100.0	100.0	100.0
Total Respondents	107	420	173	427	35	387

Source: John Blayney Associates, Metropolitan Transportation Commission

TABLE 6. COMPARISON OF THE SOCIO-ECONOMIC CHARACTERISTICS OF MOVING HOUSEHOLDS USING BART WITH THE 1976 BART PASSENGER PROFILE (Percent of Total)

	Movers Using BART[1] (1977)	BART Passenger Profile Survey[2] (1976)
Age		
Under 18	0.0	2.5
18-24	7.0	24.7
25-34	31.0	33.7
35-54	56.1	27.0
55+	5.3	12.1
Education		
Less than High School Graduate	0.0	4.8
High School Graduate	17.5	15.0
Less than College Graduate	28.1	39.3
College Graduate	33.3	16.6
Post Graduate	21.1	24.3
Income		
Under $7,000	8.4	19.7
$7,000 to $9,999	10.4	12.2
$10,000 to $14,999	12.5	18.3
$15,000 to $24,999	25.0	29.2
$25,000+	43.8	20.5
Ethnicity		
White	81.0	76.2
Black	3.4	9.5
Spanish Heritage	5.2	5.4
Asian	10.3	7.6
Other	0.0	1.4

Source: [1]John Blayney Associates, Tyler Research Associates
[2]BART 1976 Passenger Profile Survey

Modes of travel to work varied significantly among the three survey samples. BART ridership proportionally was highest among Walnut Creek respondents with 25 percent of household heads using it for commuting purposes, versus 16 percent in the Mission District and 6.7 percent in East Oakland. The distribution of travel by mode for each of the samples is shown in Table 7.

TABLE 7 . PRINCIPAL MODE OF TRAVEL TO WORK
(Percent Distribution)

	Mission District Movers	Walnut Creek Movers	East Oakland Movers
Public transit, except BART	41.1	1.3	10.0
BART	15.8	25.2	6.7
Automobile	32.6	71.6	76.7
Other	10.5	1.9	6.7
	100.0	100.0	100.0
Total Respondents	107	173	35

Source: John Blayney Associates, Tyler Research Associates

Average travel time by mode is shown in Table 8. For Mission District movers, there is no real difference in commute time for BART riders, Muni riders, or auto users. Among Walnut Creek movers, auto users average a 29 minute commute, compared with 52 minutes for BART users. However, most Walnut Creek BART patrons commute to downtown San Francisco, while people using their cars for commuting have shorter average trips, primarily to workplaces in Alameda and Contra Costa Counties and in Walnut Creek.

Table 9 indicates the socio-economic characteristics of the minority population sampled in relation to non-minority respondents. While there were significant differences in average age, income, and education, there was little difference for marriage rates and the average number of employees per household.

Sampling Implications

Because the characteristics of all households within the areas that have moved during 1975-76 are not known, it could not be determined whether there was any response bias in the survey, nor could weights to correct for such a bias

TABLE 8. RELATIONSHIP BETWEEN PRESENT COMMUTE TIME AND MODE OF TRAVEL, MISSION DISTRICT AND WALNUT CREEK MOVERS

	Mission District Movers			Walnut Creek Movers		
	Number[1] of Commuters	Percent of Total	Average[2] Travel Time (Minutes)	Number[1] of Commuters	Percent of Total	Average[2] Travel Time (Minutes)
Mode of Travel						
BART	15	15.8	24	39	25.2	52
Car or Car Pool	31	32.6	23	111	71.6	29
Other	49	51.6	24	5	3.2	58
Total Respondents	95	100.0		155	100.0	
Non-Response	12			18		

1 Single Variable distributions for Question 17a.
2 Calculated from responses to Question 18.

Source: John Blayney Associates, Tyler Research Associates

TABLE 9. RELATIONSHIP BETWEEN MINORITY STATUS AND SOCIO-ECONOMIC CHARACTERISTICS

	Minority Status		Non-Responses	T-Test Significance[1]
	White	Minority		
Average Age	37.3	32.4	4	.002
Average Education (Years)	15.0	13.5	6	.000
Average 1976 Income (Thousands of Dollars)	21.7	13.7	48	.000
Average Number of Household Members Employed	1.5	1.6	1	*
				Chi-Square Significance[2]
Percent Married	62.1	58.8	0	*
Total Respondents	264	51		

Significance level is only indicated for those statistics that are significant at the 95% confidence level or higher. For other, starred (*) comparisons, the differences are not statistically significant.

1. T-test of responses to Questions 36,37,38,39, and 40.
2. Crosstabulation of responses to Questions 33 (Now) and 40.

Source: John Blayney Associates, Tyler Research Associates

be established. Using a telephone interviewing approach introduces some unknown degree of bias into the data by the very fact that only telephone subscribing households with listed numbers are interviewed. Of the "potential transit commuters", people likely to have been influenced by BART, 93 percent have telephones in their homes, according to a 1972 study conducted in the University of California's Travel Demand Forecasting Project. Further, households without telephones have almost the same demographic characteristics as those with telephones, except for some under-representation of the elderly. While the 6-7 percent of households not having a telephone does not introduce a distinct bias to telephone surveys, the same cannot be said for unlisted telephone number households which necessarily were excluded from this sample (they are not included in reverse directories). After the survey design had been completed for this work element, a report to the Metropolitan Transportation Commission on designing telephone surveys[5] stated that 37 percent of Bay Area households had unlisted numbers and that studies elsewhere indicated that unlisted households are more likely to have household heads who are blue collar service workers, who have not completed high school, who are under age 45, and who are divorced or separated. In addition, black households are especially likely to have unlisted numbers.

The loss of unlisted numbers from the potential sample could explain the different profiles of this survey of movers in comparison with the 1973-74 BITS survey in which households were selected at random on the basis of street address and then interviewed in person. Although the movers sample overrepresents white, professional, better educated respondents, the general model presented in Chapter 5 of this report suggests that socio-economic characteristics are not good predictors of BART's impacts on household locational decisions once employment location, mode of transportation, and general residential area are given.

Ultimately, what is important is not that this sample is representative of the Bay Area population at large, or even all residents of the study areas, but rather that it is a reasonable sample of movers and their socio-economic characteristics. There is no clear evidence that a different sample would have yielded different conclusions as to the importance of BART in residence location decisions.

Limitations of the Survey

The effects of changing levels of BART service — frequency of trains, breakdowns, and delays, and the availability of feeder bus service — and BART's "public image" on residential location decisions were not addressed mainly because of interviewing time constraints, but also because such issues are extremely difficult to analyze. Changing levels of service may have affected individuals' perceptions of BART and thus its importance in location decisions. Adverse publicity also may have contributed to some disenchantment with BART as a viable alternative to the automobile. The findings reported in the next chapters should be interpreted with the problems of interim BART service in mind.

5. Nichols, William L., Designing Telephone Surveys for the Greater Bay Area, (Berkeley: Survey Research Center, University of California, June 1977).

3. FACTORS AFFECTING HOUSEHOLDS' LOCATION DECISIONS

The Work Element 3 survey was designed to elicit information about a household's decision to move from one neighborhood to another prior to addressing the role of BART in the decision-making process. To accomplish this, respondents were asked two open-ended questions:

- Why did you decide to move?
- Why did you choose your present neighborhood?

Up to this point in the interview neither BART nor public transit had been mentioned, the objective being to avoid biasing the respondent. After the respondent had given two or three reasons for moving, he or she then was asked to indicate which one of the reasons was the most important. The following sections describe the specific reasons for moving and location decisions, and Tables 10 and 11 summarize these responses.

REASONS FOR LEAVING A NEIGHBORHOOD

By far the most frequently mentioned reasons for moving focused on the need for a different kind of housing — a larger, smaller, or better space; their own place. All three samples viewed this factor as most important in the moving decision; differences among them are not pronounced. Next in terms of relative importance was a job transfer, confirming the thesis that people follow jobs. The journey to work (commute reasons) as a determinant of residential location rarely was mentioned as the most important reason (Question 5), and only among Mission District and East Oakland movers was it cited with much frequency (6 percent) as one of several reasons for moving (Question 4). Mission District respondents were the most concerned, mentioning commute reasons as the most important three times more frequently than other movers.

Less than one percent of the respondents indicated that BART was a reason to move from their old neighborhood. The greatest proportion of people wanting to move in order to become homeowners was found in the Walnut Creek and East Oakland samples. This was to be expected given the preferences of people moving out of inner city areas into suburban communities and the limited home ownership possibilities in the Mission District. People moving into the Mission District indicated more than twice as often (13 percent vs. 5-6 percent) that the most important reason for their move decision was a change in family composition. Mission District movers mentioned homeownership reasons about half as often as movers in the other two samples.

One reason for including the East Oakland sample in the Work Element 3 survey was to test BART's effect on households moving out of racially changing neighborhoods to see whether it might be having an influence on "white flight". Two of the respondents specifically stated that they moved because "the racial composition of the neighborhood was changing"; another five indicated that a change

TABLE 10. DISTRIBUTION OF REASONS FOR MOVING FROM OLD NEIGHBORHOOD[a]
(Percent of Responses for Walnut Creek (WC), Mission District (MD), and East Oakland (EO) Movers)

	All Reasons			Most Important Reasons		
Housing Needs	WC	MD	EO	WC	MD	EO
Change in family composition	6%	11%	6%	6%	13%	5%
Change in space needs	25	22	28	24	22	31
Change in tenure; bought home	10	6	14	11	7	17
Other housing reasons	1	11	8	1	12	9
Location						
Preferred new neighborhood; disliked old neighborhood	9	12	4	5	7	3
Old neighborhood was changing	3	4	14	3	3	9
Other location reasons	0	1	2	0	1	0
Job Reasons						
Changed jobs	5	1	2	6	1	2
Transferred	15	18	16	23	24	23
Commute Reasons						
To reduce time/distance	2	6	6	1	5	0
To have access to transit	1	1	0	1	1	0
To have access to BART	0	1	0	0	0	0
Other Reasons	22	6	0	19	4	0
	100%	100%	100%	100%	100%	100%
Total Respondents	173	107	35	173	107	35
(Total Responses)	(237)	(149)	(50)	(173)	(107)	(35)

a. Single variable distribution of responses to Questions 4 and 5.

Source: John Blayney Associates, Tyler Research Associates

TABLE 11. DISTRIBUTION OF REASONS FOR MOVING INTO A NEIGHBORHOOD[a]
(Percent of Responses for Walnut Creek (WC), Mission District (MD), and East Oakland (EO) Movers)

	All Reasons			Most Important Reasons		
Housing Needs	WC	MD	EO	WC	MD	EO
Better (more) housing available	9%	2%	5%	9%	2%	6%
Best available housing for money	17	20	16	28	26	29
Neighborhood						
Liked neighborhood/people	28	29	25	27	28	14
Good for children/elderly	2	1	1	1	0	0
Good schools	7	0	5	9	0	8
Safe neighborhood	3	5	3	2	4	3
Commute reasons						
Easier journey to work	6	8	7	2	6	6
Could use public transit	3	4	4	1	4	0
Could use BART	5	1	1	3	0	0
Convenience						
To shopping areas	4	5	5	2	1	0
To schools	3	2	9	1	2	8
To family/friends	0*	5	7	1	7	6
Other Reasons	13	18	12	14	20	20
	100%	100%	100	100%	100%	100%
Total Respondents	173	107	35	173	107	35
(Total Responses)	(264)	(224)	(76)	(173)	(107)	(35)

* One respondent

a. Single variable distribution of responses to Questions 6 and 7.

Source: John Blayney Associates, Tyler Research Associates

in the old neighborhood was a reason for their move. Thus, 20 percent of the East Oakland movers definitely were concerned about their former neighborhood's "change." BART's role in this decision-making process and its importance in their subsequent choice of a residence location will be addressed in the following chapter in terms of the specific hypothesis tests that were performed on the survey data.

To place the decision to move in perspective, Table 12 contains statistics from the 1975 National Housing Survey conducted in the San Francisco-Oakland SMSA. Overall, 72,000 households, representing 6.2 percent of the total surveyed in the five county SMSA, said that they had considered moving because of inadequate neighborhood services. Of particular relevance to the BART Impact Program, and more specifically to the Study of Households' Location Decisions, was the fact that inadequate public transportation was the most frequently mentioned reason for moving. More than twice as many people living outside the central cities were dissastisfied with public transportation than those living inside; whites were more concerned than minorities, and Spanish households more than black households. Although BART was not specifically addressed in the National Housing Survey, these findings suggest an opportunity for BART to influence moving and location decisions because of the improved transportation it offers certain travelers, especially those working in the central business districts. (Regrettably, more detailed crosstabulations of the National Housing Survey are not available at the time this report is being written.)

REASONS FOR CHOOSING A RESIDENCE LOCATION

Once the decision to move had been made, neighborhood considerations were mentioned most frequently by all respondents and were given as the most important reason about as often as the price of housing. People mainly looked for an attractive area with housing they could afford. Schools were valued highly by about 10-16 percent of the Walnut Creek and East Oakland movers, but did not enter into the decisions of Mission District households. This difference primarily is due to the predominance of households with children in the Walnut Creek and Mission District samples, 60 percent of the total vs. 20 percent in the Mission District sample.

Commute reasons relatively were more important in the location decisions than in the move decisions, particularly among Mission District respondents. However, almost all respondents mentioning BART as a factor in their location choice lived in Walnut Creek. Even there, BART's importance in the choice was relatively minor; only 5 percent of the Walnut Creek respondents volunteered BART as a factor in their location decision; 3 percent stated it was the most important reason.

Travel time and cost considerations were offered as reasons for selecting a specific neighborhood more frequently by Mission District and East Oakland movers than by Walnut Creek movers, suggesting that suburban movers either work nearby or would not have moved if they did not value other factors more highly than work trip time.

TABLE 12. NEIGHBORHOOD SERVICES AND THE WISH TO MOVE: STATISTICS FROM THE SAN FRANCISCO-OAKLAND NATIONAL HOUSING SURVEY1975

	Central Cities		Outside Central Cities		All Households		Black Households		Spanish Households	
	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters
Total households	153,800	267,500	466,200	282,200	620,000	549,700	46,600	80,600	32,900	37,400
Percent judging neighborhood services inadequate	34.8	29.4	44.3	31.2	41.9	30.4	43.8	40.4	44.1	31.0
Percent that would move because of inadequate neighborhood services	6.4	8.1	4.8	6.4	5.2	7.3	12.7	16.7	8.5	8.6
Services mentioned as a reason for move (Frequency Distribution)										
--Public transportation	14.7	8.1	33.2	32.9	43.7	26.2	16.7	7.1	25.7	18.9
--Schools	20.5	20.2	31.5	14.6	11.3	11.2	16.7	17.1	22.8	26.4
--Shopping	17.3	26.5	9.2	17.5	16.6	22.4	21.9	30.4	17.1	18.9
--Police protection	35.2	33.1	14.4	20.7	12.1	18.5	32.4	32.9	20.0	22.6
--Fire protection	2.6	3.4	3.8	5.7	2.4	3.1	2.6	4.5	2.8	1.9
--Hospitals or health clinics	9.6	8.6	7.9	8.5	13.9	18.5	9.6	7.9	11.4	11.3

Source: U.S. Census National Housing Survey

RELATIVE IMPORTANCE OF FACTORS AFFECTING RESIDENTIAL LOCATION DECISIONS

To gauge the relative importance of BART vis-a-vis other factors affecting residential location decisions, each respondent was asked to indicate whether a specific concern was a major consideration, a minor consideration, or not a consideration at all. This question was structured to provide a common point of comparison among all movers, as opposed to the open-ended questions about moving and location decisions previously described. Table 13 summarizes the responses to this question for each group of movers surveyed.

In Walnut Creek, three out of four respondents indicated that housing and neighborhood questions were of paramount concern, while less than half of those in the Mission District and East Oakland samples answered in a similar fashion. Ease of access to employment for the principal wage earner was the next most frequently mentioned major consideration in Walnut Creek and was the most often cited major consideration for the Mission District and East Oakland movers. In the Mission District, access to public transit, but not specifically BART, also was viewed as a major consideration by about an equal proportion of people (55 percent) as considered access to work important (57 percent). When the respondents were directly asked about the importance of BART, the Walnut Creek respondents ranked it as a major consideration two and a half times more frequently than respondents in the other two samples. Specifically, 61 percent of the Walnut Creek respondents stated that access to BART was a major or minor consideration in their location decision, compared with 39 percent of the Mission District respondents and 28 percent of the East Oakland respondents.

BART ranked in sixth place as a major consideration for Walnut Creek movers; more people thought other factors were of greater importance. By contrast, among Mission District and East Oakland movers, BART was close to the bottom of the list as a major consideration in most respondents' minds. As a minor consideration in the location decision, BART gained some support in the Mission District sample, but its relative position in the East Oakland sample remained low. In fact, over 70 percent of the East Oakland respondents indicated that BART was not a consideration, a higher negative response rate than tabulated for any other factor.

These findings suggest that BART is affecting location decisions, but that other factors are far more important. Who is influenced by BART and why is the subject of the following two chapters.

TABLE 13. RELATIVE IMPORTANCE OF FACTORS AFFECTING LOCATION DECISIONS[a]
(Percent of Total Responses)

	Walnut Creek Movers		Mission District Movers		East Oakland Movers	
	Major Consideration	Minor Consideration	Major Consideration	Minor Consideration	Major Consideration	Minor Consideration
Neighborhood Schools	45.1	17.3	11.2	14.0	37.1	11.4
Availability of Shopping and Other Services	31.2	44.5	36.4	33.6	25.7	34.3
Housing Type: Single Family vs. Apartments	75.1	14.5	37.4	30.8	45.7	28.6
Neighborhood Character:						
--Suburban	74.6	15.0	7.5	11.2	14.3	17.1
--Urban	15.0	15.6	50.5	20.6	34.3	17.1
Neighbors Similar to Movers	27.2	34.1	33.6	29.9	22.9	28.6
Ethnic Diversity in Neighborhood	9.8	29.5	30.8	37.4	25.7	20.0
Easy Access to Work	56.6	27.7	57	21.5	51.4	22.9
Neighborhood Location	43.4	29.5	35.5	27.1	22.9	40.0
Access to Public Transit	31.8	34.7	55.1	21.5	34.3	31.4
Access to BART	31.8	29.5	12.1	27.1	14.3	14.3
Total Respondents	173	173	107	107	35	35

a. Single variable distribution of responses to Questions 8, 9, and 11a.

Source: John Blayney Associates, Tyler Research Associates

To understand why BART is a factor in one households' location decision but not another's, the Work Element 3 survey was designed to address six research hypotheses. The survey results then were analyzed statistically to determine whether the data were consistent with the hypothesis or the hypothesis should be rejected. In some cases, prior expectations about the nature of BART's impact have been confirmed, but in others the evidence provided by this survey reveals some unexpected effects. In the following sections the hypothesis-specific findings are presented first, and then the question of whether certain socio-economic groups, particularly minorities, are influenced more than others is addressed. Hypotheses relating to BART's impacts on moving decisions are treated separately from those pertaining to location decisions.

IMPACTS ON MOVING DECISIONS

HYPOTHESIS 1. BART affects selection of a new residential location only after a basic move decision is made, and mainly influences the decisions of those working in a BART service area.

This hypothesis was examined from two perspectives. First, when does BART enter the decision process for residential moves? Second, how important is workplace location in explaining BART's influence on residence choice? Expressed differently, are people working in a BART service area the only ones to be influenced by BART?

Timing of BART's Influence — As reported in Chapter 3, accessibility to transit and BART in particular rarely was offered as a reason for leaving a neighborhood. In response to Question 4, two persons mentioned BART as a reason for moving from their previous residence. In contrast, 22 persons, 7 percent of the total, indicated that BART was a factor in their choice of a neighborhood (Question 6). However, relative to other factors, BART's overall influence still was quite small. Only when respondents were asked specifically about the importance of BART in their location decision did a large proportion (50 percent) indicate that it was either a major or minor consideration. These findings suggest that BART affects selection of a residential location only after a basic move decision is made.

The Importance of a BART Service Area Workplace — Among Walnut Creek respondents, households with a major or a second, equally paid wage earner working in the primary BART service area are more than twice as likely to have considered BART a major factor in their residential location decisions as other Walnut Creek respondents — a statistically significant difference.[6] In the other two study areas, differences between households with workers

6. The primary BART service area designated by the TSTB Project is a 132 zone catchment area accounting for the origins of 80 percent of all BART trips.

employed in the BART service area as opposed to those employed elsewhere were not significant; each group may be considered equally likely to influenced by BART.

These relationships are summarized in Table 14.

HYPOTHESIS 2. A change in job location to a BART service area prior to a change in residence increases the influence of BART on the location decision and the likelihood of BART use for work trips, shopping trips, and other trips.

Here, the notion was that linked moves, a job change followed by a residence change, increased a household's sensitivity to its transportation options and the importance of BART in the location decision. However, on the basis of a Chi-square test, this component of the hypothesis is supported only by the Mission District sample. The proportion of households stating that BART was a major or minor consideration in residence choice was twice as high among those with both a job change and a residence change as among movers who did not have a job change in a BART service area (see Table 15).

Among Walnut Creek movers the differences between the two groups in attitudes toward BART are not statistically significant. However, the importance of BART in residence choice is as high for all movers in the Walnut Creek sample as it is for those in the Mission District who had a job change in a BART service area. Households moving into Walnut Creek for the most part are purchasing a home and will be less willing to move following potential future job location changes than households moving into the Mission District who primarily are renters. This explains the weak correlation between respondents' attitudes toward BART and recent job changes (see Table 15). The East Oakland sample had too few people changing jobs to permit a valid statistical test.

A job location change prior to a residence location change also appears to have no bearing on the likelihood of BART use for commuting purposes. In none of the three samples are the differences between these two types of households statistically significant. Table 16 shows the usual commute mode for those changing both job and residence location versus other movers interviewed.

The relationship between a job change and BART use for shopping trips and other trips could not be tested statistically because too few job changers (7) said they use BART for nonwork trips.

HYPOTHESIS 3. BART has stimulated moves out of older urban areas by middle income white households and middle income minority group members.

None of the East Oakland respondents specifically mentioned BART as a reason for leaving their old neighborhood, and only one person out of 35 offered BART as a reason for choosing a new neighborhood. This evidence strongly suggests

TABLE 14. RELATIONSHIP BETWEEN A HOUSEHOLD WORKPLACE IN A BART SERVICE AREA AND THE IMPORTANCE OF BART IN RESIDENCE CHOICE[a]

		Importance of BART in Residence Choice (Percent of Total)			
Walnut Creek Movers	Total Respondents	Major Consideration	Minor Consideration	Not a Consideration	Chi-Square Significance Level
BART Service Area Workplace	120	38.3	28.3	33.3	.015
Workplace Elsewhere	53	17.0	32.1	50.9	
Mission District Movers					
BART Service Area Workplace	75	10.7	30.7	58.7	*
Workplace Elsewhere	31	16.1	19.4	64.5	
(Non-Response)	(1)				
East Oakland Movers					
BART Service Area Workplace	20	15.0	15.0	70.0	*
Workplace Elsewhere	15	13.3	15.3	73.3	
All Movers					
BART Service Area Workplace	215	26.5	27.9	45.6	*
Workplace Elsewhere	99	16.2	25.3	58.6	
(Non-Response)	(1)				

* Not significant at the 0.05 level.

a. Crosstabulation of responses to questions 11a, 16, 22 for the 132-zone "Primary BART Service Area" variable WPLIN, see Appendix B and Peat, Marwick, Mitchell & Company, Demography of Areas Served, BART Impact Program Working Note, October 1977.

Source: John Blayney Associates, Tyler Research Associates

TABLE 15. HOUSEHOLDS WITH A JOB LOCATION CHANGE TO A BART SERVICE AREA PRIOR TO A RESIDENCE CHANGE COMPARED TO THE IMPORTANCE OF BART IN RESIDENCE CHOICE[a]

	Total Respondents	Importance of BART in Residence Choice (Percent of Total) Major Consideration	Minor Consideration	Not Considered	Chi-Square Level of Significance
Walnut Creek Movers					
Job Change	22	31.8	22.7	45.5	
All Others	151	31.8	30.5	37.7	*
Mission District Movers					
Job Change	25	12.0	48.0	40.0	
All Others	81	12.3	21.0	66.7	0.025
(Non-Response)	(1)				
East Oakland Movers					
Job Change	2	0.0	0.0	100.0	
All Others	33	15.2	15.2	69.7	*
All Movers					
Job Change	49	20.4	34.7	44.9	
All Others	265	23.8	25.7	50.6	*

* Not significant at the 0.05 level.

[a] Crosstabulation of response to Questions 11a, 16, and 19b by KEYHH2 (see Appendix B).

Source: John Blayney Associates, Tyler Research Associates

TABLE 16. HOUSEHOLDS WITH A JOB LOCATION CHANGE TO A BART SERVICE AREA PRIOR TO A RESIDENCE CHANGE COMPARED TO USUAL COMMUTE MODE[a]

	Total Respondents	Usual Commute Mode (Percent of Total) BART	Other	Chi-Square Level of Significance
Walnut Creek Movers				
Job Change	22	13.6	86.4	*
All Others	151	23.8	76.2	
Mission District Movers				
Job Change	25	20.0	80.0	*
All Others	82	14.6	85.4	
East Oakland Movers				
Job Change	2	0.0	100.0	*
All Others	33	6.1	95.9	
All Movers				
Job Change	49	16.3	83.7	*
All Others	266	18.8	81.2	

* Not significant at the 0.05 level.

a. Crosstabulation of responses to Questions 16, 17, and 19b by KEYHH2 (see Appendix B).

Source: John Blayney Associates, Tyler Research Associates

that BART has not directly influenced moves out of East Oakland. As reported in Chapter 3 other reasons, principally housing needs, are far more important than BART in the initial decision to move. Whether middle income white families and middle income minority group members viewed BART differently in their location decisions than other movers leaving East Oakland was examined to determine what role, if any, BART might be playing in "white flight."

About the same proportion of middle income white movers (35 percent) and middle income black movers (33 percent) stated that BART was a major or minor consideration in residence choice (see Table 17). By contrast, other, lower income East Oakland movers, defined as those making less than $10,000 per year, were less influenced by BART; only 16 percent considered BART at all in their residence location decision. These findings suggest that income, not race, explains some of the variation in attitudes toward BART.

TABLE 17. IMPORTANCE OF BART IN RESIDENCE CHOICE AMONG EAST OAKLAND MOVERS[1]

	Total Respondents	Percent Considering BART of Major or Minor Importance In Residence Choice
Middle Income White	16	35.3
Middle Income Black	6	33.3
Lower Income	12	16.3

1. Crosstabulation of responses to Questions 11a, 37, and 40; middle income defined as exceeding $10,000/year.

Source: John Blayney Associates, Tyler Research Associates

Unfortunately, the small sample size (35) limited the statistical analysis that could be performed on the responses of these three subgroups separately. Social characteristics of low income households differ sharply from those of middle income households (black and white taken together). Four out of five middle income households included a married couple, and three out of four were white (see Table 18). These households earned an average of $4,300 per year more following their move. By contrast, the typical low income mover was an unmarried minority person making less money following the move than before. For these people the necessities of life — a job and housing they can afford — obviously are far more important than BART.

TABLE 18. SOCIO-ECONOMIC DIFFERENCES BETWEEN MIDDLE INCOME HOUSEHOLDS AND LOW INCOME HOUSEHOLDS MOVING FROM EAST OAKLAND[a]

	Middle Income Movers (Percent)	Low Income Movers (Percent)	Chi-Square Level of Significance
Household Composition			
Husband and wife	82.6	25.0	0.003
Other	17.4	75.0	
	100.0	100.0	
Current Marital Status			
Currently married	87.0	33.3	0.004
Other	13.0	66.7	
	100.0	100.0	
Minority Status			
White	73.9	33.3	0.050
Other	26.1	66.7	
	100.0	100.0	
Income			
Average Change in Household Income: 1976 vs. pre-move	+$4,270	-$780	*
Total Respondents	23	12	

* Not significant at the 0.05 level.
a. Crosstabulation of responses to Questions 34, 33, and 40.

Source: John Blayney Associates, Tyler Research Associates.

Differences between the East Oakland "hills" and the "flats" also were examined to see whether BART's influence on location decisions varied between households who used to live in a racially mixed neighborhood and those who formerly lived in a predominantly black neighborhood (see Table 19). Among those surveyed, attitudes toward BART as a factor in residence choice appear unrelated statistically to prior residence location; both groups for the most part are unconcerned with BART as a neighborhood amenity, affecting location decisions.

To sum up, the survey of East Oakland movers reveals no convincing evidence that BART has stimulated moves out of an older urban area. Middle income households moving out of East Oakland are twice as likely to consider BART in their location decisions. as are low income families, but the majority of those interviewed are indifferent to BART's benefits as a factor in choosing a new residence location. No statistically significant differences in attitudes of these households toward BART were found when considering middle income white, middle income black, and lower income respondents separately.

IMPACTS ON LOCATION DECISIONS

HYPOTHESIS 4. Households tend to move where BART provides improved accessibility to their workplace.

Central to the theoretical framework for assessing BART's impacts is the concept that households' location decisions are determined in part by the attributes of the transportation system. Advocates of the journey to work as a determinant of residential location posit a tradeoff between commuting time and costs and housing costs. Since BART has improved accessibility and mobility, both in relation to the transportation system that existed prior to its construction and in relation to the No-BART Alternative(NBA) defined by MTC, it should have affected housing opportunities[7]. For someone working in downtown San Francisco, for example, the number of neighborhoods within any given commute is greater with BART than the NBA.[8] Further, BART offers many commuters an attractive alternative to other modes of travel. Whether these benefits in fact were reflected in households' location decisions was tested first by stratifying according to mode — BART riders versus others — and then by relating BART's accessibility gains to its reported importance in residence choice.

Not surprisingly, 86 percent of the people who use BART to get to work considered proximity to BART an important factor in residence choice — confirming that they are taking advantage of the accessibility BART offers. However, 42 percent of non-BART commuters also stated that BART was a major or minor consideration in their location decision (see Table 20). For them, BART may be a transportation option to be used at some future date. In one sense these people are hedging their bets, protecting their investment in a home, or protecting a lifestyle, by opting for an area well served by transportation. When automobile congestion become intolerable, gasoline costs reach some unacceptable level, or they take a job closer to BART, they can switch to BART without having to move.

7. Metropolitan Transportation Commission, Rationale and Specification for the No-BART Alternative (Berkeley: BART Impact Program Working Note, September 1976).
8. For details see John Blayney Associates/David M. Dornbusch and Company, Inc., Accessibility Mapping (Berkeley: BART Impact Program Land Use and Urban Development Project Working Paper, September 1977).

TABLE 19. DIFFERENCES BETWEEN EAST OAKLAND MOVERS IN TERMS OF INCOME, ETHNICITY, AND BART'S IMPORTANCE IN LOCATION DECISIONS, BY PRIOR RESIDENCE LOCATION (Percent of Responses)[a]

	East Oakland Movers			Chi-Square Level of Significance
	Hills	Flats	Non-Responses	
Importance of BART in Residential Choice				
Major Consideration	11.8	16.7		
Minor Consideration	11.8	16.7		
Not a Consideration	76.5	66.7		*
	100.0	100.0		
Ethnicity				
White	88.2	33.3		
Black	5.9	61.1		
Spanish Heritage	5.9	5.6		.002
	100.0	100.0		
Income (1976)				
Under $7,000	5.9	25.0		
$7,000 -- $15,000	41.2	31.2		
$16,000 -- $25,000	23.5	18.8		
Over $25,000	29.4	25.0		
	100.0	100.0	(2)	*
Total Respondents	17	18		

* Not significant at the 0.05 level.
a. Crosstabulation of responses to Questions 11a, 37, and 40.

Source: John Blayney Associates, Tyler Research Associates

TABLE 20. RELATIONSHIP BETWEEN THE IMPORTANCE OF BART IN RESIDENCE CHOICE AND THE USE OF BART IN COMMUTING, BY MOVER SAMPLE[a] (Percent of Total)

	Total Respondents	Importance of BART in Residence Choice: Major Consideration	Minor Consideration	Chi-Square Significance Level
Walnut Creek Movers				
BART Commuters	39	69.2	23.1	.000
Non-BART Commuters	134	20.9	31.3	
Mission District Movers				
BART Commuters	16	37.5	37.5	.001
Non-BART Commuters	90	7.8	25.6	
(Non-Response)	(1)			
East Oakland Movers				
BART Commuters	2	50.0	0.0	*
Non-BART Commuters	33	12.1	15.2	
All Movers				
BART Commuters	57	59.6	26.3	.000
Non-BART Commuters	247	15.1	27.2	
(Non-Response)	(1)			

* Not significant at the 0.05 level.

a. Crosstabulation of responses to Questions 11a and 17.

Source: John Blayney Associates, Tyler Research Associates

On the basis of travel time comparisons with the NBA, no clear relationship exists between the accessibility gains BART offers and its importance in residence choice. Household heads working in zones to which BART provides a 20 minute or more improvement in peak hour transit travel time (one way) from their residence zone considered proximity to BART about as frequently as other households (working and living in zones served by both BART and the NBA transit system) for whom BART provides fewer travel time benefits. Table 21 shows this crosstabulation. The computed Chi-square statistic is not significant at the 0.05 level.

These findings suggest that BART's ability to attract riders from other modes is more important than its travel time superiority over the NBA in location decisions. If movers were better informed about travel times with and without BART, the survey might have shown a greater correlation between BART's potential time saving and desire to live near BART.

Another perspective on this hypothesis was provided by a test stratifying households in terms of proximity to BART, with the expectation that those living closest to a BART station would be most likely to have considered BART as an important factor in residence choice. As it turned out, the differences between people living within 10 minutes walking distance to BART and those living beyond walking distance were not statistically significant at the 0.05 level. In the Walnut Creek and Mission District samples, about the same proportion of respondents in these subsamples stated that proximity to BART was a major or minor consideration in neighborhood choice (see Table 22). At a regional scale, BART's accessibility is important, but at a neighborhood scale whether a home or apartment is within walking distance of BART appears less relevant in the evaluation of alternative sites because it is so easy to drive or take a bus to the station.

HYPOTHESIS 5. BART has a greater effect on moves to suburban locations than to urban locations.

This hypothesis was tested mainly through comparisons between the Walnut Creek (suburban) sample and the Mission District (urban) sample. The new residence locations of the East Oakland movers were identified and classified as suburban or urban, but no statistically significant differences emerged in terms of BART's importance in location decisions. Approximately 60 percent of the Walnut Creek respondents said BART was a major or minor consideration, while approximately the same percentage of Mission District respondents said BART was not a consideration — a highly significant difference. This findings tends to support the hypothesis that BART has a greater effect on moves to a suburban location than to an urban location.

The importance of BART in the residential location decision increases with the present commute time. This relationship is significant and seems to emphasize the greater importance among Walnut Creek movers (who, on an average, have much longer commute trips). This is illustrated by Table 23.

TABLE 21. RELATIONSHIP BETWEEN BART'S IMPORTANCE IN RESIDENCE CHOICE AND BART'S ACCESSIBILITY IMPACTS[a]

BART vs. NBA Improvement in Accessibility at the New Residence Location	Importance of BART in Residence Choice (Percent of Total)			
	Total Respondents	Major Consideration	Minor Consideration	Chi-Square Level of Significance
Less than 20 minute improvement	132	13.6	25.8	*
More than 20 minute Improvement	41	17.1	36.6	*
Total	173[b]	14.5	28.3	*

* Not significant at the 0.05 level.

a Crosstabulation of responses to Question 11a by a computed variable.

b Total respondents does not equal 315 because not all residence zones have transit connections common to both the BART and NBA networks.

Source: John Blayney Associates, Tyler Research Associates; John Blayney Associates/ David M. Dornbusch & Company, Inc., Accessibility Mapping, BART Impact Program Working Paper, September 1977, p. 8.

TABLE 22. RELATIONSHIP BETWEEN RESIDENTIAL LOCATION AND THE IMPORTANCE OF BART IN RESIDENCE CHOICE[a]

		Importance of BART in Residence Choice (Percent of Total)	
Walnut Creek Movers	Total Respondents	Major Consideration	Minor Consideration
Living within 10 minutes walking distance to BART	46	30.4	34.8
Living beyond walking distance	127	32.3	27.6
(Non-Response)	(1)		
Mission District Movers			
Living within 10 minutes walking distance to BART	85	14.1	27.1
Living beyond walking distance	21	4.8	28.6
(Non-Response)	(1)		

a. Crosstabulation of responses to Questions 11a and 12.

Source: John Blayney Associates, Tyler Research Associates

TABLE 23. RELATIONSHIP BETWEEN BART'S IMPORTANCE IN LOCATION DECISIONS AND COMMUTE TIMES[a]

Present Commute Time (Minutes)	Total Respondents	Importance of BART in Residence Choice (Percent of Total) Major Consideration	Minor Consideration	Chi-Square Significance
Less than 5	11	0.0	27.3	
5 to 10	27	7.4	44.4	
10 to 15	31	16.1	29.0	
15 to 20	30	13.3	33.3	.001
20 to 25	27	11.1	37.0	
25 to 30	26	15.4	19.2	
30 to 45	60	30.0	28.3	
45 to 60	50	46.0	24.0	
60 to 90	12	58.3	16.7	
Over 90	1	0.0	100.0	
(Non-Responses)	(40)			
Total	315			
Average (minutes)		41	28	

a. Crosstabulation of responses to Questions 11a and 18.

Source: John Blayney Associates, Tyler Research Associates

It should be recognized that people moving out to Walnut Creek have fewer transit options to consider. San Francisco's Mission District, on the other hand, is well served by public transit with 5 Muni buslines and the jitneys running in the Mission Street corridor alone. In fact, 41 percent of the Mission District respondents use this local transit service to get to work, compared with 16 percent riding BART. Thus, BART's relatively unimportant role in Mission District residents' location decisions is understandable. A better test would have resulted from interviews of movers to a location in Oakland or Berkeley that is not near a BART station.

HYPOTHESIS 6. Households moving into a BART service area are willing to pay more for housing than in a similar neighborhood without BART service.

Two questions addressed a households' willingness to pay a premium to live near a BART station. The first, Question 11b, asked whether, thinking of his most recent move, the respondent was willing to pay more for housing located near a BART station, while the second, Question 11c, focused on his current attitude toward paying a premium, would he pay more for a home or more in rent for a station area location. Whether respondents thought they paid more near BART was not covered because this subject is being studied in Work Element 13, using an extensive sample of sales prices and rents around BART stations.

Overall, 18 percent of those surveyed expressed a willingness to pay a premium for a station area location during their recent move, and 22 percent indicated willingness to pay a premium in a future move. This increase in a positive response percentage was expected because the second question (11c) did not bind the respondent to any past action. Approximately 90 percent of those willing to pay more for housing near a BART station also stated that BART was either a major or minor consideration in their location decision — a correlation that was anticipated.

About half the Walnut Creek BART commuters and 40-45 percent of the Mission District BART commuters were willing to pay more to live near BART; together these two groups include just over half (52 percent) of those willing to pay a premium for a station area location. The "hedgers," Walnut Creek residents who are not currently riding BART to work, account for about 85 percent of the remaining proportion of respondents who would have paid more to live near BART. As with Hypothesis 3, proximity to the station does not matter. About the same proportion of those within walking distance, as opposed to those beyond, would pay a premium — the differences are not statistically significant. These crosstabulations are summarized in Table 24.

Among Walnut Creek movers, responses to these questions suggest that BART's influence on station area housing demand in suburban communities is not likely to be strong, and that the case for high density, transit-induced housing clustered around a BART station and selling or renting at a premium is weak given competing locations that offer more neighborhood amenity, good freeway and arterial access to BART, and the general preference in such communities for low density, single family housing.

TABLE 24. RELATIONSHIP BETWEEN RESIDENTIAL LOCATION, COMMUTE MODE, AND WILLINGNESS TO PAY A PREMIUM TO LIVE NEAR BART[a]
(Percent of Total)

	Total Respondents	Past Willingness to Pay a Premium	Future Willingness to Pay a Premium	Chi-Square Significance Level
Walnut Creek Movers				
BART Commuters	38	50.0	53.8	.001
Non-BART Commuters	115	20.0	23.5	
Living within 10 minutes walking distance of BART	46	30.4	33.3	*
Living beyond walking distance	127	22.4	26.8	
(Non-Response)		(1)	(2)	
Mission District Movers				
BART Commuters	15	40.0	46.7	0.000
Non-BART Commuters	80	5.0	7.5	
Living within 10 minutes walking distance of BART	86	11.6	14.1	*
Living beyond walking distance	21	--	4.8	
(Non-Response)			(1)	

* Not significant at the 0.05 level.

a. Crosstabulation of responses to Questions 11b, 11c, 12, and 17a.

Source: John Blayney Associates, Tyler Research Associates

WHO IS INFLUENCED BY BART?

Having examined BART's effects on moving and location decisions in terms of the research hypotheses, the next step was to determine whether BART affects specific socio-economic groups, particularly minorities, differently. For purposes of this analysis the responses of all three samples were pooled to create a composite picture of movers influenced by BART. The data suggest that households with economic ability to choose among locations and that do not expect to move again in the near future are most likely to want to live near BART.

First, BART's influence increases with age, education, and income. Respondents in their 30s and 40s with a college degree and annual household incomes above $25,000 are much more likely to have considered BART a major factor in their residence location than the younger, lower income high school graduates, as the statistics in Table 25 demonstrate. This profile mainly stems from the characteristics of the Walnut Creek movers who represent the majority of those interviewed who considered BART important in residence choice.

White and asian respondents took proximity to BART into account more frequently than black or Spanish heritage respondents (see Table 25). Blacks evidenced the lowest concern for BART, with only 20 percent indicating that proximity to BART was a major or minor consideration in residence choice. By contrast, 50 percent of the other minority respondents stated that BART affected their location decisions.

Among occupational groups BART had the greatest influence on professional and technical workers, proprietors and managers, clericals, and operatives (see Table 25). Sales workers (who showed the greatest interest in BART as a factor in job choice in the survey of downtown workers) proportionally expressed less interest in BART as a factor in residence choice than other occupational groups[9]. However, the reported differences in BART's importance in residence choice for the occupational groups are not statistically significant at the 0.05 level.

Turning to the relationship between tenure, household composition, and BART's influence on the location decision, those most attracted to BART tended to be married couples with children who had just purchased a home. Single adults and renters, most of whom lived in the Mission District, showed the least interest in BART. The single working parent household with one or more children also expressed relatively little concern for accessibility to BART as a factor in neighborhood choice, probably because many such households combine work trips with child dropoff and pickup, a finding confirmed by recent surveys conducted by the University of California[10].These findings are summarized in Table 26.

When respondents are stratified by prior residence and current workplace, an interesting pattern emerges (see Table 27). First, people moving into the Mission

9. For details see John Blayney Associates/David M. Dornbusch and Company, Inc., Study of Workers' Location Decisions (Berkeley: BART Impact Program Land Use and Urban Development Project Working Paper, November 1977).
10. Michael Fajans and Ira Fink, Faculty/Staff Survey Volume I: Transportation Patterns, (Berkeley: University of California, May 1977).

TABLE 25. RELATIONSHIP BETWEEN SOCIO-ECONOMIC CHARACTERISTICS AND THE IMPORTANCE OF BART IN RESIDENCE CHOICE[a]

		Importance of BART in Residence Choice (Percent of Total)	
Age	Total Respondents	Major Consideration	Minor Consideration
Under 25	33	12.1	30.3
25 to 34	133	18.8	30.1
35 to 44	77	27.3	31.2
Over 44	67	31.3	14.9
(Non-responses)	(5)		
Education			
High School	59	13.6	20.3
Trade School or 1-3 Years College	92	22.8	27.2
College Graduate or Higher	157	24.8	30.6
(Non-responses)	(7)		
Income			
Under $7,000	34	2.9	20.6
$7,000 - $15,000	69	20.3	20.3
$15,000 - $25,000	71	19.7	35.2
Over $25,000	92	31.5	27.2
(Non-Responses)	(45)		
Ethnicity			
White	264	23.9	28.0
Spanish Heritage	16	18.8	18.8
Black	15	13.3	6.7
Other	19	26.3	36.8
(Non-Responses)	(1)		
Occupation			
Professional, Technical	99	25.3	34.3
Proprietors, Managers	55	34.5	16.4
Sales Workers	33	18.2	24.2
Clerical	28	25.0	25.0
Craftsmen, Formen	27	18.5	25.9
Operatives	13	23.1	30.8
Service Workers	26	7.7	42.3
Other	9	11.1	11.1
(Non-Responses)	(24)		

a. Crosstabulation of responses to Questions 11a, 37, 38, 39, and 40.

Source: John Blayney Associates, Tyler Research Associates

TABLE 26. IMPORTANCE OF BART IN RESIDENCE CHOICE BY TENURE AND HOUSEHOLD COMPOSITION OF RESPONDENTS[a]

Tenure	Total Respondents	Importance of BART in Residence Choice (Percent of Total) Major Consideration	Minor Consideration
Owners	175	30.3	26.9
Renters	137	13.9	27.7
(Non-Responses)	(3)		
Household Composition			
Husband and wife with children	131	32.8	29.0
Husband and wife	59	25.4	30.5
Single parent household	18	16.7	16.7
Single adult	47	12.8	12.8
Other	59	11.9	33.9
(Non-Responses)	(1)		

a. Crosstabulation of responses to Questions 11a, 31, and 34.

Source: John Blayney Associates, Tyler Research Associates

TABLE 27. RELATIONSHIP BETWEEN PRIOR RESIDENCE AND CURRENT WORKPLACE AND IMPORTANCE OF BART IN RESIDENCE CHOICE[a]

Prior Residence	Total Respondents	Importance of BART in Residence Choice (Percent of Total) Major Consideration	Minor Consideration
San Francisco-Oakland or San Jose SMSA	239	18.8	27.2
Elsewhere	75	38.4	23.5
(Non-Response)	(1)		
Principal or Equal Wage-earners' Workplace			
San Francisco	138	33.3	26.8
Elsewhere	176	15.6	27.3
(Non-Response)	(1)		

a. Crosstabulation of responses to Questions 11a, 24, and 25a.

Source: John Blayney Associates, Tyler Research Associates

District or Walnut Creek from outside the Bay Area, defined for purposes of this analysis as the San Francisco-Oakland or San Jose SMSAs, indicated that BART was a major consideration in their residential location decision twice as frequently as former Bay Area residents (38.4 percent versus 18.8 percent). Whether this is due mainly to BART's national image, to lack of prior attachment to particular neighborhoods, or to an automobile commute trip was not addressed in the survey. The second comparison showed that San Francisco workers were twice as likely as respondents employed elsewhere to have considered BART as an important factor in residence choice, again suggesting that BART's primary appeal is to the downtown commuter. Automobile commuters to San Francisco are the only Bay Area commuters who must pay high parking fees, so the option to use BART is particularly attractive and understandably might influence location decisions.

5. A GENERAL MODEL

The bivariate analyses summarized in Chapters 3 and 4 examined the importance of BART in selecting a residential location in relationship to several locational, workplace, trip time, mode, and socio-economic variables. The analyses yielded some interesting and statistically significant relationships, but have only limited predictive capability. Also, a potential problem with bivariate techniques is that the different independent variables are often interrelated, and therefore conclusions based on the individual crosstabulations can be deceptive. Therefore, an explanation of the variation in (prediction of) the dependent variable must be based also upon the joint distribution of the interrelated explanatory variables. To account for both the individual and the joint distribution effects a stepwise regression program was used to estimate a multiple regression model with the importance of BART (IBART) as the dependent variable. The following sections describe the regression model and the data set, and summarize the principal findings and limitations of this analysis.

THE CONCEPTUAL MODEL

The multiple regression equation shows the relationship between a dependent variable and two or more independent variables. The general model takes the form:

$$Y = A + B_1X_1 + B_2X_2 + \ldots B_nX_n$$

where Y is the dependent variable and the Xs are the independent, predictor variables. Using empirical data, A and $B_1, B_2 \ldots B_n$, the constant and coefficients of the predictive relationship are estimated. Normally, the variables in a regression are interval or ratio scale variables; however, it is possible to extend the range and usefulness of the linear model by using dichotomous or dummy variables. These are specially constructed variables representing temporal, spatial, or other qualitative effects.

The stepwise regression procedures used in the Statistical Package for the Social Sciences (SPSS) were employed in this analysis. With this technique, each independent variable is selected to enter the equation in the order of its importance in explaining the remaining variation of the dependent variable.

The dependent variable of the model is denoted IBART. It is defined as a dummy (dichotomous) variable which takes on the value one (1) if BART proximity is a major consideration and the value zero (0) otherwise.[11] Thus, since the dependent variable is a function of the independent variables X, and since it is limited to the range 0, ... 1, an estimated (or predicted) value for IBART can be interpreted as the estimated conditional probability of IBART given the Xs.[12]

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11. Since the dependent variable is dichotomous, the error term is heteroscedastic. As a result the estimates of the coefficients are unbiased but the estimates of their variances are biased and inefficient.
12. J. Johnston, Econometric Methods, New York: McGraw Hill Book Co., 1972.

Three data sets were employed: all survey respondents with residence location treated as a dichotomous variable, Walnut Creek movers, and Mission District movers. The low number of East Oakland respondents was not sufficient to develop a separate model for East Oakland.

The independent variables were selected on the basis of journey to work theories and empirical research. The hypothesis was that they would have a significant influence on the probability of a respondent viewing BART as an important consideration in their residence location decision. The independent variables included:

- CBD1 — Downtown San Francisco work location in an MTC zone within 10-15 minutes walking distance of a BART station. (1 = yes, 0 = all others)
- CBD2 — Downtown Oakland work location within walking distance of BART. (1 = yes, 0 = all others)
- WPOTH — Work location in a BART service area not in CBD1 or CBD2. (1 = yes, 0 = all others)
- AGE — Respondent's age, coded to the midpoint of the response category.
- Y1 — Annual household income (1976), coded to the midpoint of response category.
- WCOL1 — Primary wage earner in professional or managerial occupation. (1 = yes, 0 = all others)
- WCOL2 — Primary wage earner in sales or clerical occupation (1 = yes, 0 = all others)
- WHITE - Respondent's ethnic status. (1 = white, 0 = all others)
- NTRIP — Primary wage earner's one way commute time in minutes, coded to midpoint of response category.
- MTRANS1A — Primary wage earner's principal mode of transportation. (1 = BART, 0 = all others)
- MTRANS2A — Primary wage earner's principal mode of transportation prior to recent move. (1 = BART, 0 = all others)
- HHCOMP1 — Household composition: Husband, wife, and children. (1 = yes, 0 = all others)
- HHCOMP2 — Household composition: Husband and wife with no children. (1 = yes, 0 = all others)
- HHCOMP3 — Household composition: Single parent with child. (1 = yes, 0 = all others)
- HHCOMP4 — Household composition: Single adult (1 = yes, 0 = all others)

- WLC — Walnut Creek residence location.(1 = yes, 0 = all others)

- MS — Mission District residence location. (1 = yes, 0 = all others)

Other variables were rejected because validated theories and/or prior analysis had indicated that no relationship was likely. Thus, for example, accessibility to BART, measured in Questions 12 (10 minutes walking time) and 13 (10 minutes driving time) indicated no relationship between importance of BART in location decision and close proximity to a BART station. Further, 305 of the 315 total responses reported living within a 10-minute drive of a BART station. To take another example, cross-correlations of IBART with the "change" variables, indicating an increase or decrease in income or commute time, for instance, showed no statistically significant relationships.

SPECIFICATION OF THE MODEL

The model explained a significant amount of the variation in IBART for all movers combined and for the Walnut Creek sample considered alone. For the Mission District sample the predictive relationship was found to be very weak. The coefficients of the independent variables along with statistics indicating their relative significance are summarized in Tables 28 and 29 ; t statistics significant at the .95 confidence level are starred (complete model output is attached as Appendix B). Occasionally, the sign of a coefficient is the opposite of what was hypothesized. There are two potential explanations for this. First, multi-collinearity between variables can cause a sign reversal; and second, the theory behind the hypothesis may indeed not be supported by the empirical data. The latter is more likely the case where the standard error of the estimated coefficient is small. The principal findings of this analysis are summarized in the following sections.

All Movers

Current and prior mode of transportation are the two significant variables which together "explain" 25 percent of the variance in perceived importance of BART (see Table 30). The lack of significance of age, ethnic status, and income are noteworthy, particularly since they are uncorrelated to mode. Bearing in mind the SPSS algorithm that controls the order in which variables are entered in a stepwise procedure (respective contribution to explained variance given the variables already in the equation), age was the seventh variable entered, while ethnic status was the eighth, and both had standard errors which were greater than the coefficients. For example, the coefficient of age was .0028 while the standard error of the coefficient was .0029; for ethnic status the coefficient and standard error were -.0560 and .0698 respectively. In contrast to these, the coefficient of the best predictive variable, mode of transportation, was .1220 with a standard error of only .0292. Income entered the equation but as the fourteenth variable.

If mode of transportation is excluded from the equation, trip length, a downtown San Francisco work location, and a Walnut Creek residence location "explain" 19.5 percent of the variation in IBART. Professional or managerial occupational category and a downtown Oakland work location are the next two variables to enter the equation, but they only add an additional 1 percent explanation, and not with statistical significance. Again, age, income, and ethnicity are unimportant predictor variables, entering the equation sixth, eighth, and eleventh positions respectively, and with no statistical significance.

Walnut Creek Movers

The key variables for predicting BART importance in Walnut Creek were current and prior mode of transportation, and a work location within walking distance of a downtown San Francisco BART station. These three variables yield an R-square of .43. If mode of transportation is eliminated from the equation, a downtown San Francisco work location, the length of commute trip, and a downtown Oakland work location are key indicators of BART importance, yielding an R-square of .36. These are not unexpected results. What is interesting, however, is that the socio-economic variables such as income, age, and ethnic status again are not significant variables in explaining BART's impact on residence choice. Thus, previous hypotheses that these were significant indicators of BART importance cannot be supported from the analyses conducted in this survey.

Mission District Movers

For the Mission District respondents no more than six percent of the variation in IBART is explained by the model and its variables. Current primary mode of transportation is the only significant independent variable at the F.95 level, yielding an R-square of .059. The forced addition of additional variables increases R-square to .16, but none of the additional variables are significant. If mode of transportation is deleted from the list of independent variables, there is no variable that produces a significantly non-random explanation of variation in IBART.[13]

Limitations of the Model

Before summarizing the findings and implications of the general model, several limitations should be considered. First, the model investigates only the likelihood of BART proximity being cited as an important consideration in residence choice, rather than comparing BART proximity to other potential decision factors.

13. While for the Walnut Creek and all movers populations the use of major consideration versus minor or not a consideration for IBART produced a better equation (and also seemed a better theoretical formulation — as a minor consideration would not be very important), an equation for the Mission District sample using major or minor consideration versus no consideration produced a slightly higher R-square, .073, with mode of transportation again the significant variable. White ethnic status came in second and raised R-square to .11, but was not significant at the .95 level. This combination of major and minor consideration for the Mission might work better because so few respondents (12 percent) in the Mission District felt BART was a major consideration in their locational decision.

TABLE 28. MODEL SPECIFICATIONS (COEFFICIENTS AND STATISTICS) -- ALL MOVERS

DEPENDENT VARIABLE = IMPORTANCE OF BART IN RESIDENCE LOCATION (IBART)
(1 = Major Consideration; 0 = Minor or No Consideration)

Independent Variable	With Mode As Variable		Without Mode As Variable	
	Coefficient	t Statistic	Coefficient	t Statistic
Mode of Transportation (MTRANS1A)	.1220	4.18*	--	--
Prior Mode of Transportation (MTRANS2A)	.0951	2.87*	--	--
Downtown S.F. Workplace (CBD1)	.0656	.86	.2454	3.53*
Downtown Oakland Workplace (CBD2)	-.1398	.97	.0836	.63
Trip Time (NTRIP)	.0011	.61	.0047	2.75*
Other BART Access Workplace (WPOTH)	-.0945	1.36	-.0207	.30
Age (AGE)	.0028	.95	.0024	.86
Ethnic Status (WHITE)	-.0560	.80	-.0224	.30
Household Income (Y1)	-.0004	.13	-.0013	.46
Occupational Category				
-- Professional (WCOL1)	.0088	.13	.0628	.93
-- Clerical/Sales (WCOL2)	.0183	.22	.0168	.21
Household Composition				
-- Husband, Wife, Children (HHCOMP1)	--	--	.0288	.38
-- Husband, Wife, No Child (HHCOMP2)	-.0177	.24	-.0201	.23
-- Single Parent, Child (HHCOMP3)	-.0605	.48	--	--
-- Single Adult (HHCOMP4)	-.0414	.50	-.0112	.12
Walnut Creek Movers (WLC)	.0241	.35	.0958	1.02
Mission District Movers (MS)	--	--	-.0364	.38
Constant	.0773	--	-.9883	--
R^2 / F Ratio	.279	4.12**	.209	4.10**

* Significant at the t.95 confidence level
** Significant at the F.95 confidence level

Source: John Blayney Associates

TABLE 29. MODEL SPECIFICATIONS (COEFFICIENTS AND STATISTICS) -- WALNUT CREEK MOVERS

DEPENDENT VARIABLE = IMPORTANCE OF BART IN RESIDENCE LOCATION (IBART)
(1 = Major Consideration; 0 = Minor or No Consideration)

Independent Variable	With Mode As Variable		Without Mode As Variable	
	Coefficient	t Statistic	Coefficient	t Statistic
Mode of Transportation (MTRANS1A)	.1347	2.58*	---	---
Prior Mode of Transportation (MTRANS2A)	.0820	2.07*	---	---
Downtown S.F. Workplace (CBD1)	.1443	.85	.4704	4.25*
Downtown Oakland Workplace (CBD2)	-.1261	.47	.2702	1.53
Trip Time (NTRIP)	.0023	.73	.0073	3.05*
Other BART Access Workplace (WPOTH)	-.0236	.22	.0146	.14
Age (AGE)	---	---	-.0044	1.17
Ethnic Status (WHITE)	-.0585	.41	.0982	.68
Household Income (Y1)	.0006	.14	.0015	.45
Occupational Category				
-- Professional (WCOL1)	.1119	.84	.3181	2.83*
-- Clerical/Sales (WCOL2)	.1932	1.20	.2910	2.19*
Household Composition				
-- Husband, Wife, Children (HHCOMP1)	-.1238	.88	-.2417	1.80
-- Husband, Wife, No Child (HHCOMP2)	-.1600	1.09	-.2433	1.73
-- Single Parent, Child (HHCOMP3)	-.2694	1.13	-.1717	.74
-- Single Adult (HHCOMP4)	-.2010	.84	-.1708	.82
Constant	.0801	---	-.1503	---
R^2 / F Ratio	.459	3.88**	.418	6.12**

* Significant at the t .95 confidence level
**Significant at the F .95 confidence level

Source: John Blayney Associates

Second, no attempt has been made to isolate multicollinearity effects on interrelationships between independent variables. Finally, the general model is derived from data on households moving into Walnut Creek, into the Mission District, or out of East Oakland, and therefore is indicative of the attitudes of only those types of households. Similar attitudes may exist among long-time residents of the three study areas and among Bay Area movers generally, but these households were not surveyed.

CONCLUSIONS

For all survey respondents, current and prior primary mode of transportation are the key variables in explaining BART importance as a consideration. These two factors explain 25 percent of the variation in the probability of IBART. When combined with a downtown San Francisco workplace, these three independent variables explain 43 percent of the variance in IBART among Walnut Creek respondents. However, although the formulation with mode of transportation yields higher R-square values, the preferred model is the one without current and prior mode. Obviously, those who use BART are fairly likely to consider BART as an important consideration. It seems more useful to be able to predict propensity to view BART as important given other factors with mode unknown.

With mode deleted, commute time, a downtown San Francisco work location, and a Walnut Creek residence location explain approximately 20 percent of the variance in IBART. For Walnut Creek respondents, a downtown San Francisco work location, a downtown Oakland work location, and commute trip time explain 36 percent. Socio-economic factors such as ethnic status, age, income, and household composition are not significant indicators in any equation.

The dummy variable for Walnut Creek residents is generally correlated with the variables of current commute time (.37), age (.21), household income (.53), ethnic identity (.32), and a traditional household composition of husband, wife, and children (.25). These findings suggest that Walnut Creek commuters considering BART important in residence choice share certain socio-economic characteristics; i.e., a similar commuting time, age, household income, ethnic identity, and household type, and the Walnut Creek dummy may be interpreted (as in factor analysis) as an "index" for these socio-economic characteristics.

Predicted IBART Values for Typical Movers

To illustrate how the model might be used, BART's importance in the location decision of a typical household coming into Walnut Creek, into the Mission District, and out of East Oakland was predicted.

Table 30 shows the predicted IBART values without mode as a variable and with mode as a variable. The values assumed are study area averages for each of the independent variables in the regression equation, with several exceptions. The Walnut Creek mover was assumed to be white, married with children, and working in San Francisco. In the Mission District the mover was assumed to be of Spanish heritage, married with no children, and working in the BART service area, but not downtown San Francisco. Finally, the typical East Oakland

mover was specified as black, married without children, and working in downtown Oakland. For the model including mode as an independent variable, each mover was assumed to ride BART to work.

Not surprisingly, the results for Table 30 show that the Walnut Creek respondent was much more likely to attach importance to BART proximity in the residence location than either of the remaining two typical respondents (without mode as a variable). Trip length and downtown San Francisco CBD coefficients cause the largest variation in IBART. When it is given that the respondent is a BART commuter (Table 30), the difference between study areas is less pronounced, but still evident. It is possible that some empirical combinations of the independent variables would yield a predicted IBART of greater than one or less than zero. This would result from the lack of perfection of the model, and such predicted IBART scores should be interpreted to mean virtually total or no probability, respectively, of perceiving BART as important as a residence location criterion.

It is interesting that although the R square values are higher with mode of transportation included, the models without mode show greater locational differences in the predicted IBART levels. This would seem to be a result of the many hedgers in Walnut Creek (i.e., those who indicate BART proximity is important, but are not presently BART users). If BART usage is assumed, as it is in the example with mode in the equation, these people are eliminated. However, when no assumption about mode is made, the hedgers come into the equation, and the importance of BART among Walnut Creek respondents jumps up substantially. However, in the Mission District the probability of BART being important decreases because there are few hedgers in that sample.

Overall, use of BART or, ignoring that, a downtown San Francisco or Oakland work location and trip time are the best predictors of BART importance for respondents in the case study areas. The question naturally arises whether these models can be used in other contexts, elsewhere in the Bay Area or in another metropolitan area considering a rail rapid transit system. Besides indicating the highest propensity to view BART as important among the Walnut Creek respondents, the models also better explain the variation in response among the Walnut Creek respondents. Because of these strengths the model is most suited for predicting BART's impacts on the location decisions of other Bay Area residents considering neighborhoods within 10 minutes drive of a suburban BART station, particularly if the residential zone is one in which accessibility is improved substantially with BART in comparison with the NBA. The model is definitely less effective in predicting behavior for more urban respondents who have other transit options, as typified by the Mission District respondents. Therefore, particular caution should be used in attempting to generalize these results to all situations.

Of those areas surveyed in this analysis, the average travel time with BART vs. the NBA is reduced the most in the Contra Costa County-San Francisco corridor (Accessibility Mapping Working Paper, page 13). Therefore, it is not surprising that workers in San Francisco living in Walnut Creek would have the highest probability of considering access to BART as important in their residence location decision. BART accessibility is not perceived differently by lower income or minority workers per se, but rather these people are less likely to live in an

TABLE 30. PREDICTED VALUES ON THE IMPORTANCE OF BART PROXIMITY IN RESIDENCE CHOICE FOR ASSUMED TYPICAL RESPONDENTS IN EACH STUDY AREA.

	Predicted Probability of BART Being Important in Residence Choice (1=Major Consideration, 0=Minor or No Consideration)	Standard Error[1]
1. Model -- All Movers		
Without Mode As A Variable		
Typical Walnut Creek Movers	.537	±.389
Typical Mission District Movers	.016	±.389
Typical East Oakland Movers	.194	±.389
With Mode As A Variable		
Typical Walnut Creek Movers	.400	±.348
Typical Mission District Movers	.228	±.348
Typical East Oakland Movers	.203	±.348
2. Model -- Walnut Creek Movers		
Typical Mover:		
-- Without Mode As A Variable	.625	±.378
-- With Mode As A Variable	.386	±.349

[1] Technically these standard errors are only accurate for the mean values of the coefficients, and standard errors increase slightly with distance of an observation from the mean.

Source: John Blayney Associates

area of improved accessibility with BART. Likewise, they are less likely to be employed in the San Francisco CBD with its high BART accessibility. If employment opportunities for the minority population expand, one would expect to see BART's importance in their residence location decisions increase. Also, as the propensity to purchase a home increases, the likelihood of BART being important seems to increase. These are several factors which would seem to merit more detailed analysis in a long-term monitoring of BART impacts.

6. CONCLUSIONS AND IMPLICATIONS

To answer the questions posed in the Introduction to this paper, long distance commuters who recently moved to Walnut Creek and work in downtown San Francisco and, to a lesser extent, downtown Oakland are taking BART into account in their residential location decisions. For inner city residents, particularly the transit dependent, BART is a relatively unimportant factor in choosing a neighborhood. The principal findings of the Work Element 3 survey pertaining to the original research hypotheses can be summarized as follows:

- BART has had virtually no influence on the initial decision to move, and proximity to BART rarely was the determinant of residential choice. Relative to other factors, BART's influence on location decisions was quite small and mainly affected those working in the BART service area.

- Only among Mission District movers, who primarily were lower income, unmarried renters, did a change in job location prior to a change in residence location increase BART's importance in neighborhood choice. Even though such a sequence of moves may have increased an individual's awareness of transportation and commuting options, the likelihood of using BART was unaffected.

- BART has not stimulated moves out of older urban areas in the sense that such moves were made because of BART accessibility at other locations. Housing needs and, to a lesser extent, inadequate neighborhood services, cause such moves. However, in the location decisions of middle income movers leaving such areas, BART is a more important factor than in those of lower income movers. At these income levels, there were no discernible differences between minority and non-minority respondents.

- Most BART riders surveyed (86 percent) took proximity to a BART station into account in residential location decisions, but more importantly 43 percent of the commuters who now drive or take the bus to work also considered BART in choosing a neighborhood in which to live. For these households, BART represented an opportunity to keep transportation options open.

- Walnut Creek movers valued access to BART more often than Mission District movers primarily because of the service it has provided to downtown San Francisco, Oakland, and other major employment centers. Most Mission District workers find Muni more convenient. Those living within 10 minutes driving time were influenced as frequently, proportionally, as those within the same walking time, suggesting that close geographic proximity is a relatively unimportant factor in explaining BART's impacts on location decisions.

- Those who considered BART in their location decisions also were willing to pay a premium to live near BART, and location relative to the station itself — within or beyond walking distance — had no significant effect on response.

Those most influenced by BART tended to be older, better educated, and higher paid than respondents who did not consider BART in their location decisions. Further, owners tended to be much more interested in BART as an amenity than renters, possibly because they have a longer term perspective. For them, the prospect of potential future highway congestion and significantly higher auto commuting costs, possibly due to gasoline shortages and/or high central city parking charges, may have increased the importance of proximity to BART as a means of protecting their investment in a home. (Further research is required to confirm whether this interpretation of the survey findings is valid or if this, in fact, is a BART impact.)

Comparisons with the NBA — the MTC-defined regional bus transit system that might have existed in the absence of BART -- showed that movers most influenced by BART are not necessarily working in the areas to which BART offers the greatest improvement in accessibility. However, to the extent that BART increases capacity in the Bay Bridge corridor more than the NBA, it will have a greater influence on location decisions over time than the NBA because the Transbay commuters, both BART riders and non-riders, are most sensitive to the advantages BART offers. Further, BART's impacts on the location decisions of those now commuting by car or bus suggests that a highly visible, well publicized transportation improvement will have a greater effect on decision-making than patronage alone would suggest. If this is true, then the NBA with its marginal additions to an existing bus fleet and modest changes in service levels would not have influenced the decisions of "hedgers" as much as BART did.

The demand for housing within walking distance of BART appears weak, but respondents may have been unable to visualize a desirable residential environment near the BART stations they know. The low proportion of people moving into the Mission District who considered BART an important amenity suggests that rehabilitation or redevelopment to capture a BART market is not justified in older urban areas. However, this statement might not be accurate for an urban residential area not served as well by other transit as is the Mission by Muni.

Responses of Walnut Creek movers suggest that BART is affecting the suburban housing market, but that this impact is not limited to the immediate station area. Further, this market is much more likely to be looking for townhouses and single family homes than for rental apartments. While a transit-oriented rental market for high density, station area housing may exist, Work Element 3 surveys provide little evidence that it is very large. However, few of the respondents who wanted to live near the station may have been able to find housing within walking distance.

POLICY IMPLICATIONS

A better understanding of how BART, and possibly rail transit anywhere, affects residential location decisions can aid in formulating land use and urban development policy. The findings of this survey correlated with the findings of other

work elements, notably the studies of workers' location decisions, office construction, and the housing industry, suggest the following policy implications.

First, because BART has virtually no impact on mobility rates (the initial move decision), in the three areas surveyed, population growth (or decline) in the central cities and older urban areas may be unaffected unless job locations also are affected. Changes in housing needs cause most people to move, and the journey to work remains a critical determinant of residential location along with local market conditions, public services, and neighborhood amenities. Consequently, housing opportunities in such areas are likely to be affected only to the extent that BART affects locational decisions, and draws people to the suburbs who otherwise might have considered an urban location.

Second, BART may have some effect on corridor growth rates and development patterns, but will not under current conditions provide sufficient impetus for clustering of much high density housing around suburban automobile-oriented stations. Some households are attracted to or would pay a premium for a station area location, and over the long-run a market for housing close to BART may exist. Careful planning and marketing will be required to make expectations become reality. If communities want to encourage station area development, they should provide for a mix of housing within walking distance, catering to couples and families as well as single persons. Housing options should include townhouses and condominium apartments for purchase by various household types.

Third, to the extent that BART plays a role in the centralization of office space, or at least delays decentralization, it will affect the housing markets in the suburban communities it serves, transferring a certain amount of development pressure from areas not directly served. However, the overall rate of suburbanization will not be affected because BART is a relatively unimportant factor in moving and location decisions.

Four, BART and those planning for other (proposed) rail transit systems should consider the possibility of hedging in their marketing plans and service improvement programs. Households who use the bus or auto may move to a location near BART to keep their transportation options open. For them minor service improvements, satellite parking lots and good feeder bus service may be sufficient incentives to begin to ride BART. Analysis of the access needs of this subgroup should be considered a priority item in long-range planning for increased BART use. Likewise local governments should consider this impact in formulating station area land use plans.

BIBLIOGRAPHY

Aldrich, H. "Ecological Succession in Racially Changing Neighborhoods." Urban Affairs Quarterly. Vol. 10:3 (1975), pp. 327-350.

Alonso, William. Location and Land Use. Cambridge, Massachusetts: Harvard University Press, 1964.

Brown, H.J. "Changes in Workplace and Residential Location." Journal of the American Institute of Planners. Vol. 41:1 (January 1975), pp. 32-39.

Cunningham, Phoebe H. "Black Income and Metropolitan Residential Dispersion." Urban Affairs Quarterly. Vol. 10:3 (March 1975), pp. 273-296.

Droettboom, T., et al. "Urban Violence and Residential Mobility." Journal of the American Institute of Planners. Vol. 37:5 (September 1971), pp. 319-325.

Guest, A.M., and C. Cluett. "Workplace and Residential Location: A Push-Pull Model." Journal of Regional Science. Vol. 16:3 (December 1976), pp. 399-410.

Johnston, J. Econometric Methods. New York: McGraw Hill Book Co., 1972.

Kain, John F. Essays on Urban Spatial Structure. Cambridge, Massachusetts: Ballinger Publishing Company, 1975.

Kain, John F. Race, Ethnicity, and Residential Location. Cambridge, Massachusetts: Department of City & Regional Planning, Harvard University, May 1976.

Kain, John F., and Gary R. Fauth. The Effects of Urban Structure on Household Auto Ownership Decisions and Journey to Work Mode Choices. Cambridge, Mass: Department of City & Regional Planning, Harvard Univ., May 1976.

Li, Mingche M. "A Logit Model of Homeownership: The Case of Multi-Dimensional Interactions," Discussion Paper D75-5, Harvard University Department of City and Regional Planning, August 1975.

Nathanson, Constance A. "Moving Preferences and Plans Among Urban Black Families." Journal of the American Institute of Planners. Vol 40:5, pp 353-359.

Nicholls, W. L. Sampling and Fieldwork Methods of the 1973-74 BART Impact Travel Survey. Berkeley, California: Metropolitan Transportation Commission, 1974.

Pickvance, C.G. "Life Cycle, Housing Tenure and Intra-Residential Mobility: A Causal Model." Sociological Review. Vol. 21:2 (May 1973), pp. 279-297.

Putnam, Stephen H. "Intra-Urban Employment Forecasting Models: A Review and a Suggested New Model Construct." Journal of the American Institute of Planners. Vol. 38:4, pp. 216-230.

Quigley, John M. "Residential Location with Multiple Workplaces and a Heterogeneous Housing Stock." Unpublished Ph.D. dissertation, Harvard University, 1973.

Rose, H.M. Black Suburbanization. Cambridge, Massachusetts: Ballinger Publishing Company, 1976.

Rosenfeld, Carl. "Job Seeking Methods Used by American Workers." Monthly Labor Review. (August 1975) pp. 39-42.

Stegman, Michael A. "Accessibility Models and Residential Location." Journal of the American Institute of Planners. Vol. 35:1, pp. 23-29.

Straszheim, M. "Housing Market Discrimination and Black Housing Consumption." Quarterly Journal of Economics. Vol 88 (January 1974) pp. 19-43.

Varady, David P. "White Moving Plans in a Racially Changing Middle Class Community." Journal of the American Institute of Planners. Vol 40:5 (September 1974), pp. 360-370.

Zimmer, Basil G. "Residential Mobility and Housing." Land Economics. (August, 1973) pp. 344-350.

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APPENDIX A

QUESTIONNAIRE FOR STUDY OF HOUSEHOLDS' LOCATION DECISIONS

The telephone questionnaire reproduced on the following pages includes a listing of the actual number of responses for each sample surveyed — 107 people moving into San Francisco's Mission District (MD), 173 people moving into Walnut Creek (WC), and 35 people moving out of East Oakland (EO). Total responses pooling all three samples also are indicated.

For details on how the survey data were coded and prepared for statistical analysis, the Survey Methodology working note should be consulted.[1] All survey data will be available in machine readable form at the Metropolitan Transportation Commission following completion of the project.

1. Tyler Research Associates, Survey Methodology for the Study of Households' Location Decisions (Berkeley: BART Impact Program, Land Use and Urban Development Project Working Note, December 1977).

BEGINNING TIME: _____ I.D. No. _____

HOUSEHOLDS' LOCATIONAL DECISIONS STUDY

TELEPHONE QUESTIONNAIRE

Household Name _____ Phone No. _____

Address _____ City _____ Zip _____

CENSUS TRACT NO._____ RTZ # _____ 10-12

OAKLAND OUT-MIGRANTS

Previous Address _____

Previous Phone No. _____

CENSUS TRACT NO. _____ RTZ # _____ 13-15

Hello, I'm _____ from Tyler Research, a national public opinion research firm. Am I speaking to a member of the (HOUSEHOLD NAME) household? (IF YES, CONTINUE WITH INTRODUCTION. IF NO, CHECK ADDRESS AND PHONE NO. WITH RESPONDENT AND ATTEMPT TO TRACE THE HOUSEHOLD SHOWN ON THE CALL RECORD SHEET THROUGH THE RESPONDENT, THEN TERMINATE.)

We are conducting a survey about why people live where they do, and the kinds of transportation they use, and I'd like to ask someone in your household a few brief questions.

1. First, are you the (MALE) (FEMALE) head of the household, or is some other household member?

   Yes ( ) (SKIP TO Q.3)

   No ( ) (CONTINUE WITH Q.2)

2. Is either the male or female head of your household at home at the present time?

   Yes ( ) (ASK TO SPEAK TO THE OLDEST OF THE HEADS OF HOUSEHOLD PRESENTLY AT HOME. REINTRODUCE YOURSELF AND CONTINUE WITH Q.3)

   No ( ) (FIND OUT TIME TO CALL BACK WHEN A HEAD OF HOUSEHOLD WILL BE AVAILABLE)

   Day _____ Time _____ AM/PM

3. First, how long have you lived at your present address?

	(MD)	(WC)	(EO)	(TOT)	
Less than 1 year	(16)	16	8	40	
1 to less than 2 years	(56)	109	2	167	
2 to less than 3 years	(35)	48	25	108	
3 years or more	(44)	30	79	153	Terminate
Refused (DO NOT READ)	(70)	63	35	168	

4. Thinking back about the last place where you lived before you moved to your present address. In general, what reasons can you remember why you decided to move from there? (DO NOT READ LIST. CHECK EACH REASON RESPONDENT MENTIONS) PROBE: What other reasons were there?

5. At that time, what one thing was the most important reason for your decision to move? (CIRCLE MOST IMPORTANT REASON)

Question 4					Question 5			
(MD)	(WC)	(EO)	(Tot)		(MD)	(WC)	(EO)	(Total)
				HOUSING NEEDS				
17	15	3	35	Change in family composition (got married, divorced, separated, widowed, had addition to family, etc.)	14	10	2	26
2	1	2	5	Moved in with friend(s)	2	1	1	4
9	24	7	40	Bought a home	8	19	6	33
3	9	2	14	Wanted own place	3	8	2	13
21	40	11	72	Wanted larger/Smaller/Different space	16	29	8	53
8	11	1	20	Better housing	4	5	1	10
15	2	2	19	Lower Rent	11	1	2	14
				LOCATION				
18	21	2	41	Preferred present location/Disliked old neighborhood	8	9	1	18
1	-	1	2	Convenient to shopping	--	--	--	--
1	-	-	1	Friends in area	1	--	--	1
4	7	5	16	Old neighborhood was changing	3	5	3	11
1	1	2	4	The racial composition of the neighborhood was changing	--	1	--	1
				JOB REASONS				
-	2	1	3	Couldn't get a job near old location	--	1	1	2
1	9	-	10	Changed jobs	1	9	--	10
				COMMUTE REASONS				
8	4	2	14	To make it easier to get to work/Shorter trip to work	4	2	--	6
1	2	1	4	To make it faster to get to work	1	--	--	1
-	-	-	-	To make it cheaper to get to work	--	--	--	--
2	2	-	4	So could use public transit to get to work (PROBE FOR TYPE)	1	1	--	2
2	-	-	2	(CODE HERE FOR SYSTEMS OTHER THAN BART)				
				So could use BART to get to work (SPECIFIC MENTION)	--	--	--	--
				OTHERS				
-	-	-	-	Got a raise, could afford it	--	--	--	--
8	12	-	20	Climate	1	7	--	8
-	1	-	1	To have better access to highways, to be able to get out of town easier	--	--	--	--
26	35	8	69	Other _____ (SPECIFY)	26	26	8	60
1	39	-	40	Job Transfer	1	39	--	40
				No Most Important Reason	2	--	--	2

6. Why did your household choose the neighborhood you are now in to move to? (DO NOT READ LIST. CHECK EACH REASON RESPONDENT MENTIONS) PROBE: What other reasons were there?

7. What one reason was the most important in your household's decision to move to your present neighborhood? (CIRCLE MOST IMPORTANT REASON)

Q.6 MD	WC	EO	TOTAL		Q.7 MD	WC	EO	TOTAL
				HOUSING				
5	29	4	38	Better housing was available in neighborhood	2	13	2	17
-	5	-	5	More housing was available in neighborhood	-	2	-	2
44	63	12	119	Best available housing for money	28	49	10	87
				NEIGHBORHOOD				
42	96	17	155	Liked the area/Neighborhood	17	44	5	66
23	5	2	30	Liked the people in the neighborhood	13	2	-	15
12	11	2	25	Neighborhood was safe	4	4	1	9
1	3	-	4	Good neighborhood for older people	-	1	-	1
2	3	1	6	Good neighborhood for children	-	1	-	1
-	27	4	31	Good schools in neighborhood	-	16	3	19
				COMMUTE REASONS				
10	13	2	25	Was easy to get to work from	4	2	-	6
5	7	2	14	Was closer to workplace than previous neighborhood	2	2	2	6
2	-	1	3	Was faster to get to work from	-	-	-	-
-	-	-	-	Was cheaper to get to work from	-	-	-	-
8	10	3	21	Could use public transit to get to work (PROBE FOR TYPE) (CODE HERE FOR SYSTEMS OTHER THAN BART)	4	1	-	5
2	19	1	22	Could use BART to get to work (SPECIFIC MENTION)	-	6	-	6
1	-	-	1	Could walk to work	-	-	-	-
				CONVENIENT				
10	13	4	27	Convenient to/Near shopping	1	3	-	4
5	12	7	24	Convenient to/Near school	2	1	3	6
12	1	5	18	Convenient to/Near family, friends	8	1	2	11
				OTHERS				
30	10	-	40	Liked the climate, weather	11	1	-	12
-	3	3	6	Could afford to move to neighborhood	-	2	2	4
10	34	6	50	Other _____ (SPECIFY)	9	20	5	34
				No most important reason	2	2	-	4

SKIP 74-79
Col. 80-3

Once people have decided exactly where they will move to, they generally have weighed the importance of many considerations before making that decision. I'd like you to think back to the last time you moved, and tell me how important several considerations were to your household in deciding exactly where you were going to move.

As I read you a list of different considerations, would you please tell me whether it was a major consideration, a minor consideration, or not a consideration at all in your household's decision about where you were going to move to. First, would you say that (READ FIRST STATEMENT) was a major consideration, a minor consideration, or not a consideration at all in your household's decision to move? (REPEAT QUESTION FOR EACH STATEMENT BELOW)

	CONSIDERATION															
	Major				Minor				Not At All				Not Applicable Don't Know			
	MD	WC	EC	TOT	MD	WC	EO	TOT	MD	WC	FO	TOT	MD	WC	EO	TOT
The availability of schools in the neighborhood	12	78	13	103	15	30	4	49	80	65	18	163	-	-	-	-
The availability of shopping and other services in the neighborhood	39	54	9	102	36	77	12	125	32	42	14	88	-	-	-	-
The type of housing like single family or apartment buildings in the neighborhood	40	130	16	186	33	25	10	68	31	18	9	58	3	-	-	3
The neighborhood being in a suburban area	8	129	5	142	12	26	6	44	85	18	24	127	2	-	-	2
The neighborhood being in an urban area	54	26	12	92	22	27	6	55	28	116	16	160	3	4	1	8
The ease of access to work for the principal wage earners or earner in your household	61	98	18	177	23	48	8	79	23	27	9	59	-	-	-	-
The people in the neighborhood being very much like your own household	36	47	8	91	32	59	10	101	36	67	17	120	3	-	-	3
The specific location of the neighborhood, that is, the area within a five block radius of your home	38	75	8	121	29	51	14	94	37	46	13	96	3	1	-	4
The people in the neighborhood being a good cross-section of different ethnic groups	33	17	9	59	40	51	7	98	34	105	19	158	-	-	-	-

9. How much of a consideration was access or nearness to any of the Bay Area public transportation systems in your household's decision on exactly where to move? Was it: (READ LIST AND RECORD BELOW)

	MD	WC	EO	TOTAL	
A major consideration	59	55	12	126	(ASK Q.10)
A minor consideration	23	60	11	94	
Not a consideration at all	25	58	12	95	(SKIP TO Q.11a)

10. Which Bay Area public transportation system would that be?

	MD	WC	EO	TOTAL
Easy to get to/Near a San Francisco MUNI stop	64	-	-	64
Easy to get to/Near an AC Transit bus stop	1	-	16	17
Easy to get to/Near a BART station	13	110	7	130
Easy to get to/Near a jitney stop	-	-	-	-
Easy to get to/Near a Samtrans (formerly Greyhound) stop	-	-	-	-
Easy to get to/Near a Peerless Stages stop	-	-	-	-
Other _____ (SPECIFY)	-	3	-	3
Don't know, not applicable	29	60	12	101

11a. Specifically, was the new home's being near a BART station a major consideration, a minor consideration or not a consideration at all in your household's decision to move to your present address?

	MD	WC	EO	TOTAL
A major consideration	13	55	5	73
A minor consideration	29	51	5	85
Not a consideration at all	64	67	25	156
Don't know, not applicable	1	-	-	1

11b. Thinking of your household's most recent move, were you willing to pay more for housing located near a BART station than for comparable housing not located near a BART station?

Yes, willing to pay more	10	42	5	57
No, not willing to pay more	97	129	29	255
Don't know, not applicable	-	2	1	3

11c. Again, as far as you personally are concerned, would you be willing to pay more for a home or more in rent if the housing was located near a BART station than if it was not?

Yes	13	49	8	70
No	93	123	27	243
Don't know, not applicable	1	1	-	2

12. Now, I'd like to talk a bit about the public transportation systems in the Bay Area. Which of the following kinds of public transportation are within easy walking distance of your home; that is, within 10 minutes or so walking time? (READ LIST. RECORD BELOW)

	Within Walking Distance Of Home: Yes				Within Walking Distance Of Home: No				Don't know Not Applicable			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MC	WC	EO	TOTAL
AC Transit	4	43	32	79	102	121	3	226	1	9	-	10
San Francisco MUNI	106	-	-	106	1	170	35	206	-	3	-	3
BART	86	46	-	139	21	127	28	176	-	-	-	
Samtrans (formerly Greyhound)	12	23	-	35	82	139	33	254	13	11	-	24
Jitney	78	13	-	91	24	153	35	212	5	7	-	12
Peerless Stages	1	-	-	1	80	150	33	263	26	23	-	49

13. (FOR EACH TYPE OF TRANSPORTATION NOT WITHIN WALKING DISTANCE OF HOME, ASK:) Some people drive in cars to public transportation, park or are dropped off, and then complete their trip to work by public transportation. Which of the following kinds of public transportation are within 10 minutes or so driving time of your home? (READ LIST)

	Within 10 Minutes Driving Time: Yes				Within 10 Minutes Driving Time: No				Don't Know Not Applicable			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MC	WC	EO	TOTAL
AC Transit	31	53	1	85	66	60	2	128	10	60	32	102
San Francisco MUNI	1	-	-	1	-	163	32	195	106	10	3	119
BART	20	124	22	166	1	3	6	10	86	46	7	139
Samtrans (formerly Greyhound)	32	18	5	55	44	114	26	184	31	41	4	76
Jitney	14	8	-	22	9	135	34	178	84	30	1	115
Peerless Stages	3	1	1	5	72	136	30	238	32	36	4	72

14. (FOR EACH ONE ANSWERED "YES" IN Q.13, ASK:) How easy would it be for the members of your household to drive to and park, or be dropped off at (TRANSPORTATION), and then take it to work? Would you say very easy, moderately easy, moderately difficult, or very difficult?

	Very Easy				Moderately Easy				Moderately Difficult			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MC	WC	EO	TOTAL
AC Transit	8	17	-	25	3	5	-	8	4	11	1	16
San Francisco MUNI	-	-	-	-	1	-	-	1	-	-	-	-
BART	9	72	7	88	5	19	6	30	3	7	2	1
Samtrans (formerly Greyhound)	10	7	1	18	3	4	1	8	3	1	1	
Jitney	6	2	-	8	1	-	-	1	-	1	-	1
Peerless Stages	3	-	-	3	-	-	-	-	-	-	-	-

	Very Difficult				Don't know, Not Applicable			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
AC Transit	15	17	-	32	77	123	34	234
San Francisco MUNI	-	-	-	-	106	173	35	314
BART	3	23	6	32	87	52	14	153
Samtrans (formerly Greyhound)	13	5	2	20	78	156	30	264
Jitney	6	5	-	11	94	165	35	294
Peerless Stages	-	-	1	1	104	173	34	311

15. Now, I'd like to talk about the places where the members of your household are employed. Are you the major wage earner in your household or is another household member?

	MD	WC	EO	TOTAL
Respondent is major wage earner	54	57	12	123
Other household member is major wage earner	20	79	14	113
Respondent is one of two or more equal wage earners	27	27	5	59
No wage earner in household	6	10	4	20

16. (INTERVIEWER: Q.16 THROUGH Q.20 ARE TO BE ASKED IN TERMS OF THE MAJOR WAGE EARNER OR IN TERMS OF THE RESPONDENT IF THE RESPONDENT IS AN EQUAL WAGE EARNER)

I don't need to know the specific address, but please tell me the name of the city where (THE MAJOR WAGE EARNER/YOU) works and the nearest cross streets to that address.

CITY _____

Cross Streets _____ and _____

Works at home ( ) (SKIP TO Q.19a) RTZ # _____ 43-45

17a. What kind of transportation (DO YOU/DOES THE MAJOR WAGE EARNER) usually use to get to and from that location? (NOTE: IF ANY PUBLIC TRANSPORTATION MENTIONED, PROBE FOR HOW RESPONDENT GOT TO IT) (RECORD BELOW. IF MORE THAN ONE FORM OF TRANSPORTATION MENTIONED, ASK:) Which kind of transportation (DO YOU/DOES THE MAJOR WAGE EARNER) use for the longest (distance) part of the trip?

	Use For Longest Part of Trip				Use For Rest Of Trip			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
AC Transit	-	-	3	3	-	1	1	2
San Francisco MUNI	37	1	-	38	1	1	-	2
BART	15	39	2	56	2	-	-	2
Golden Gate Transit	-	-	-	-	-	-	-	-
Southern Pacific Railway	-	-	-	-	-	-	-	-
Samtrans (formerly Greyhound)	-	1	-	1	1	-	-	1
Jitney	2	-	-	2	-	-	-	-
Private Auto, Truck, Van	28	98	21	147	1	31	1	33
Car-pool (3 or more in car)	3	13	2	18	-	2	-	2
Walk	7	1	-	8	49	9	2	60
Motorcycle	1	-	-	1	-	0	-	-
Bicycle	2	-	1	3	1	2	-	3
Taxi	-	-	-	-	-	0	-	-
Other _____ (SPECIFY)	-	2	1	3	-	1	-	1
Don't know, not applicable	12	18	5	35	52	126	31	209

(IF "PRIVATE AUTO, TRUCK, VAN" NOT MENTIONED IN Q.17a, ASK:)

17b. (DO YOU/DOES THE MAJOR WAGE EARNER IN YOUR HOUSEHOLD) have an automobile or truck or van which (YOU/HE) could use to commute to work in if (YOU/HE) wanted to?

	MD	WC	EO	TOTAL
Yes, have private vehicle available	43	23	6	72
No, do not have private vehicle available	22	-	2	24
Don't know, not applicable.	42	150	27	219

17c. Which of the following kinds of public transportation are within easy walking distance of (YOUR/THE MAJOR WAGE EARNER'S) JOB?

	Within Walking Distance Of Job			
	MD	WC	EO	TOTAL
AC Transit	29	79	23	131
San Francisco MUNI	80	57	3	140
BART	59	77	12	148
Samtrans (formerly Greyhound)	12	29	3	44
Jitney	45	25	1	71
Peerless Stages	1	1	1	3

18. Approximately how long does it take (YOU/THE MAJOR WAGE EARNER) to get to (YOUR/HIS) job?

	MD	WC	EO	TOTAL
Less than 5 minutes	4	7	--	11
5 to less than 10 minutes	7	14	6	27
10 to less than 15 minutes	17	8	7	32
15 to less than 20 minutes	15	10	5	30
20 to less than 25 minutes	14	11	2	27
25 to less than 30 minutes	17	5	4	26
30 to less than 45 minutes	12	43	5	60
45 to less than 60 minutes	7	43	--	50
60 minutes to less than an hour and one-half	2	9	1	12
One and one-half hours or more	--	1	--	1
Don't know, not applicable.	12	22	5	39

19a. Have (YOU/THE MAJOR WAGE EARNER) changed jobs or employers since you moved to your present housing location?

	MD	WC	EO	TOTAL
Yes	28	20	3	51
No	72	143	28	243
Don't know, not applicable	7	10	4	21

19b. (INTERVIEWER: REFER TO Q.3 TO DETERMINE HOW LONG RESPONDENT HAS LIVED AT PRESENT ADDRESS, THEN SAY:) You say that you have lived at your present address for (ANSWER IN Q.3). Did (YOU/THE MAJOR WAGE EARNER) change jobs or employers in the year preceding your household's move?

	MD	WC	EO	TOTAL
Yes	30	26	7	63
No	70	137	24	231
Don't know, not applicable	7	10	4	21

19c. Could you have used BART to get to the job you had the year before you moved?

	MD	WC	EO	TOTAL
Yes	6	5	1	12
No	23	20	6	49
Don't know, not applicable	78	148	28	254

20. What is (YOUR/THE MAJOR WAGE EARNER'S) occupation? And in what industry is that?

OCCUPATION _____

INDUSTRY _____ _____62-63

	MD	WC	EO	TOTAL
Professional	33	60	6	99
Managerial	8	44	3	55
Sales	7	25	1	33
Clerical	15	9	4	28
Craftsman	9	11	7	27
Operatives	6	3	4	13
Service	17	7	2	26
Laborers	1	1	2	4
Household	--	--	--	--
Farm	--	--	--	--
Armed Forces	1	1	--	2
Other	1	--	2	3
No Answer	3	2	--	5
Not Applicable	6	10	4	20

(IF RESPONDENT IS "MAJOR WAGE EARNER" OR "EQUAL WAGE EARNER" IN Q.15, SKIP TO Q.23. OTHERWISE, ASK:)

21. Are you currently employed in either a permanent full-time job or a permanent part-time job? (PROBE: Is that in your home or outside your home?) (RECORD BELOW)

	MD	WC	EO	TOTAL
Yes, permanent full-time outside	6	13	6	25
Yes, permanent part-time outside	5	10	4	19
Work at home	---	4	1	5
Not employed	9	51	3	63
Don't Know/Not Applicable	87	95	21	203

22. I don't need to know the specific address, but please tell me the name of the city where you work and the nearest cross streets to your workplace?

CITY _____

Cross Streets _____ and _____

RTZ # _____ 65-67

(IF RESPONDENT IS "EQUAL WAGE EARNER" IN Q.15, ASK Q.23 AND Q.24. OTHERWISE SKIP TO Q.25)

23. Is the other wage earner or equal wage earner in your household currently employed in either a permanent full-time job or a permanent part-time job?

	MD	WC	EO	TOTAL
Yes, permanent full-time	18	23	4	45
Yes, permanent part-time	6	3	1	10
Not employed in a permanent job	3	--	--	3
Don't Know/Not Applicable	80	146	30	257

24. I don't need to know the specific address, but please tell me the name of the city where the other equal wage earner works and the nearest cross streets to that place.

CITY _____

Cross Streets _____ and _____

RTZ # _____ 69-71

(IF RESPONDENT IS AN OAKLAND OUT-MIGRANT -- FRONT OF QUESTIONNAIRE -- SKIP TO Q.26. OTHERWISE ASK:)

25a. Now, I'd like to talk about your previous residence. Before you moved to your present address, did you live in one of the following Bay Area counties of: San Francisco; Alameda; Contra Costa; Santa Clara; San Mateo; or Marin; or did you live somewhere else? (IF MARIN, ASK:) What city in Marin did you live in? (RECORD BELOW)

Lived In:

	MD	WC	EO	TOTAL
San Francisco	82	12	--	94
Alameda	6	12	35	53
Contra Costa	0	82	--	82
San Mateo	3	5	--	8
Santa Clara	2	1	--	3
Marin	--	--	--	--
City_____				
Lived somewhere else	14	61	--	75

25b. I don't need to know the specific address, but please tell me the name of the city where you lived before you moved to your present residence and the nearest cross streets to that place.

CITY _____

Cross Streets _____ and _____

RTZ # _____ 74-76

26. How long did you live at your previous address? (READ LIST AND RECORD BELOW)

	MD	WC	EO	TOTAL
Less than 1 year	26	10	4	40
1 to less than 2 years	33	30	10	73
2 to less than 3 years	10	18	8	36
3 to less than 4 years	6	10	1	17
4 to less than 5 years	4	11	3	18
5 to less than 10 years	6	19	2	27
10 years or more	8	14	7	29
Don't know, not applicable	14	61	-	75

INTERVIEWER:

Refer to Q.15. If respondent is major or equal wage earner ask Q.'s 27 and 28 in terms of respondent. If "Other Household Member Is Chief Wage Earner," ask Q.'s 27 and 28 in terms of chief wage earner.

CARD 3 COL. 1-3
DUP. COLS. 2-9

27a. How did (YOU/THE MAJOR WAGE EARNER) usually get to and from work when you lived at your previous residence? (RECORD BELOW, IF MORE THAN ONE FORM OF TRANSPORTAION MENTIONED: ASK) Which kind of transportation did (YOU/THE MAJOR WAGE EARNER) use for the longest (distance) part of (YOUR/HIS) commute? (IF RESPONDENT GOES TO WORK ONE WAY AND RETURNS BY ANOTHER MEANS OF TRANSPORTATION, BE SURE TO INDICATE WHICH IS WHICH)

	Used For Longest Part Of Commute				Used For Rest Of Commute			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
AC Transit	-	-	7	7	-	-	1	1
San Francisco MUNI	39	1	-	40	1	1	-	2
BART	4	17	1	22	-	-	-	-
Golden Gate Transit	-	-	-	-	-	-	-	-
Southern Pacific Railway	-	-	-	-	-	-	-	-
Samtrans (formerly Greyhound)	-	4	-	4	1	-	-	1
Jitney	1	-	-	1	-	-	-	-
Private Auto, Truck, Van, Motorcycle, Etc.	28	73	21	122	-	16	1	17
Car-pool (3 or more in car)	-	6	3	9	-	1	-	1
Don t know, not applicable	1	-	-	1	-	-	-	-
Walk	13	5	1	19	35	7	6	48
Bicycle	1	-	-	1	-	1	-	1
Taxi	-	-	-	-	-	-	-	-
Other _____ (SPECIFY)	1	1	1	3	1	-	-	1
Work at home	-	3	-	3	-	-	-	-
No employed member in household at that time	5	2	1	8	-	-	-	-
Don't know, not applicable	14	61	-	75	69	147	37	243

(NOTE: IF ANY PUBLIC TRANSPORTATION MENTIONED, PROBE FOR HOW GOTTEN TO)

27b. (IF BART IS NOT MENTIONED UNDER EITHER "USED FOR LONGEST PART OF COMMUTE" OR "USED FOR REST OF COMMUTE," ASK) Could (YOU/THE MAJOR WAGE EARNER) have used BART to get to or from work when you lived at your previous residence? (RECORD BELOW)

	MD	WC	EO	TOTAL
Yes, could have used BART	16	22	10	48
No, could not have used BART	63	68	22	153
Don't Know (DO NOT READ)	4	0	1	5
Not applicable	24	83	2	109

28. Approximately how long did it take (YOU/THE MAJOR WAGE EARNER) to get to (YOUR/HIS) job from your previous residence?

	MD	WC	EO	TOTAL
Less than 5 minutes	5	8	-	13
5 to less than 10 minutes	8	11	7	26
10 to less than 15 minutes	10	12	5	27
15 to less than 20 minutes	14	9	6	29
20 to less than 25 minutes	11	8	5	24
25 to less than 30 mintues	17	10	4	31
30 to less than 45 minutes	11	16	3	30
45 to less than 60 minutes	9	23	2	34
60 minutes to less than 90 minutes	2	2	1	5
One and one-half hours or more	-	1	-	1
Don't know, not applicable	50	73	2	95

29. Now, I'd like to talk about trips you make from your present home to places other than work. What one kind of transportation do you use most often for ... (READ CATEGORIES AND RECORD BELOW) (PROBE FOR ONE TYPE OF TRANSPORTATION USED)

	Shopping (Other than For Groceries) During Week				Shopping (Other than For Groceries) On Weekends				Going to Shows or Entertainment				Appointments Such As Doctors And Dentists, Etc.			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
AC Transit	-	-	3	3	-	-	3	3	-	-	3	3	-	-	2	2
San Francisco MUNI	36	-	-	36	34	-	0	34	27	-	0	27	46	-	-	46
BART	3	2	1	6	-	-	-	-	1	4	2	7	2	3	1	6
Golden Gate Transit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern Pacific Railway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samtrans (formerly Greyhound)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jitney	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Private Auto, Truck, Van	43	165	29	237	55	170	31	256	70	167	29	266	50	168	30	248
Car-pool (3 or more in car)	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-
Walk	21	4	1	26	14	2	-	16	4	-	-	4	6	1	1	8
Motorcycle	-	1	-	1	-	1	-	1	-	1	-	1	1	1	-	2
Bicycle	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
Taxi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other _____ (SPECIFY)	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	1
Don't know	4	1	1	6	4	-	-	5	3	-	1	4	1	-	1	2

30. Overall, what one kind of transportation do the other members of your household use most often for ... (READ CATEGORIES AND RECORD BELOW) (PROBE FOR ONE TYPE OF TRANSPORTATION USED MOST BY ALL MEMBERS OF HOUSEHOLD IN TOTAL) (IF RESPONDENT IS A SINGLE PERSON HOUSEHOLD CHECK HERE ( ) AND SKIP TO Q.31)

	School Trips				Shopping (Other Than For Groceries On Weekends				Going Shows or Entertainment				Appointments Such As Doctors And Dentists, Etc.			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
AC Transit	-	-	3	3	-	1	4	5	-	-	2	2	-	-	2	2
San Francisco MUNI	19	-	-	19	29	-	-	29	20	-	-	20	27	-	-	27
BART	-	2	-	2	1	-	-	1	2	2	-	4	-	1	-	1
Golden Gate Transit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern Pacific Railway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Samtrans (formerly Greyhound)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jitney	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Private Auto, Truck, Van	8	62	10	80	30	155	24	209	45	157	28	230	36	158	28	222
Car-pool (3 or more in car)	-	3	1	4	-	-	-	-	1	-	-	1	1	-	-	1
Walk	2	7	2	11	8	2	1	11	2	-	-	2	5	1	-	6
Motorcycle	-	-	-	-	1	1	-	2	-	1	-	1	1	1	-	2
Bicycle	-	11	-	11	1	2	-	3	-	1	-	1	1	-	-	1
Taxi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other _____ (SPECIFY)	3	12	3	18	-	-	-	-	-	-	-	-	-	-	-	-
Don't know	7	2	-	9	3	1	1	5	3	1	-	4	2	1	-	3
Not applicable	68	74	16	158	34	11	5	50	34	11	5	50	34	11	5	50

I have just a few more background questions.

31. Do you own your home or rent?

	MD	WC	EO	TOTAL
Own	12	145	18	175
Rent	95	27	16	138
Don't know/No answer	--	1	1	2

32. Do you own or have regular access to the use of a _____?
(READ LIST AND CHECK EACH TYPE OF VEHICLE OWNED OR ACCESSIBLE)

	YES				NO			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
Car	81	170	30	281	9	3	2	14
Truck or van	13	48	10	71	77	125	22	224
Motorcycle or motorbike	4	21	3	28	86	152	29	267
Bicycle	35	125	15	175	55	48	17	120
None (DO NOT READ)	17	--	3	20	--	--	--	--

33. Which of the following categories describes your current marital status? (READ LIST AND RECORD BELOW) Which describes your marital status before you made your most recent household move?

	NOW				BEFORE MOVE			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
Married	33	137	24	194	30	135	23	188
Separated	2	4	--	6	1	1	--	2
Widowed or divorced	17	10	6	33	16	11	5	32
Never married	55	20	5	80	60	24	7	91
Refused (DO NOT READ)	--	2	--	2	--	2	--	2

34. Which of these categories best describes the composition of your household? (READ CATEGORIES AND CHECK ONE WHICH BEST DESCRIBES RESPONDENT'S HOUSEHOLD)

	MD	WC	EO	TOTAL
Single family with husband and a wife and with children	21	94	17	132
Single family with a husband and a wife and without children	10	44	5	59
Single parent household, one adult and at least one child	6	8	4	18
Single adult	32	9	6	47
Two or more unrelated adults	32	13	1	46
Two or more related adults	4	5	1	10
Two or more unrelated adults with at least one child	--	--	1	1
Two or more related adults with at least one child	1	--	--	1
Some other arrangement_____ (SPECIFY)	1	--	--	1

35a. In the six months before your household's most recent move, did the number of members in your household increase, decrease or remain the same? (RECORD BELOW)

35b. In the six months after your household's most recent move, did the number of members in your household increase, decrease or remain the same? (RECORD BELOW)

	Q. 35a 6 Months Before				Q. 35b 6 Months After			
Number of Household Members:	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
Increased	12	14	4	30	15	16	4	35
Decreased	13	13	2	28	6	7	3	16
Remained the same	82	146	29	257	86	150	27	263
Refused (DO NOT READ)	-	-	-	-	1	-	1	1

36. How many of the people in your household are currently employed half-time or more? How many were employed half-time or more before you made your most recent household move?

	Now				Before Move			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
One	51	87	14	152	41	84	16	141
Two	33	65	15	113	3	70	16	129
Three	11	8	1	20	8	7	2	17
Four	2	3	1	6	6	2	-	8
Five	1	1	-	1	-	2	-	2
Six	1	1	-	2	1	1	-	2
Seven	-	-	-	-	-	-	-	-
Eight	-	-	-	-	-	-	-	-
Nine or more	-	-	-	-	-	-	-	-
Refused (DO NOT READ)	1	-	-	1	2	-	-	2
None	8	8	4	20	6	7	1	14

37. In 1976, was your total household income above or below $15,000, before taxes? Please tell me when I reach the category which includes your total annual household income. (BEGIN READING CATEGORIES ABOVE OR BELOW $15,000)

And which category includes your total household income before you made your most recent household move?

	Now				Before Move			
	MD	WC	EO	TOTAL	MD	WC	EO	TOTAL
None or less (DO NOT READ)	-	-	-	-	-	1	-	1
Under $5,000	12	1	5	18	14	3	2	19
$5,000 to less than $7,000	14	2	-	16	13	2	1	16
$7,000 to less than $10,000	20	5	4	29	21	5	4	30
$10,000 to less than $15,000	23	10	8	41	22	8	12	42
$15,000 to less than $20,000	10	22	2	34	8	28	6	42
$20,000 to less than $25,000	6	26	5	37	5	31	4	40
$25,000 to less than $50,000	6	67	9	82	6	58	4	68
$50,000 or more	-	10	-	10	-	6	-	6
Refused, No Answer (DO NOT READ)	16	30	2	48	18	31	2	51

38. Which of the following categories includes the last grade of school that you completed?

	MD	WC	EO	TOTAL
No formal schooling	--	--	--	--
Up to 8th grade	2	1	1	4
9th through 11th grade	4	1	3	8
High school graduate	14	23	10	47
Trade or vocational school	1	3	2	6
One year of college	10	9	2	21
Two or three years of college (including junior college)	24	35	6	65
College graduate	29	58	4	91
One year or more of graduate school	21	40	6	67
Refused (DO NOT READ)	2	3	1	6

39. Which of the following categories includes your age? (READ LIST)

	MD	WC	EO	TOTAL
Under 19	1	1	--	2
20 to 24	15	15	1	31
25 to 29	38	24	7	69
30 to 34	21	32	12	65
35 to 39	9	29	8	46
40 to 44	9	20	2	31
45 to 49	4	17	--	21
50 to 54	2	15	--	17
55 to 59	2	8	3	13
60 to 64	1	2	--	3
65 to 69	2	4	1	7
70 and over	2	3	1	6
Refused	1	3	--	4

40. Which of the following categories best describes your ethnic background? (READ LIST AND RECORD BELOW)

	MD	WC	EO	TOTAL
American Indian or Alaskan Native	--	--	--	--
Asian or Pacific Islander	12	7	--	19
Black/African-American	2	1	12	15
Spanish-American/Spanish Heritage	13	1	2	16
Caucasian/White	79	164	21	264
Other _____ (SPECIFY)	1	--	--	1

Those are all the questions I have. Thank you very much for participating in this survey. The study is being conducted for the Metropolitan Transportation Commission in an effort to understand the effects of public transportation services on the communities they serve. The results of this study will be used to help plan for better service in this and other communities throughout the country. We very much appreciate your help.

INTERVIEWER'S NAME _____

DATE _____

TIME COMPLETED _____

APPENDIX B

DETAILED RESULTS OF REGRESSION ANALYSIS

All Movers	Page
- Correlation Coefficients	B-1
- Regression Model (Without Mode)	B-2
- Regression Model (With Mode)	B-3

Walnut Creek Movers

- Correlation Coefficients	B-4
- Regression Model (Without Mode)	B-5
- Regression Model (With Mode)	B-6

CORRELATION COEFFICIENTS

All Movers

	IBART	CBD1	CBD2	AGE	Y1	WCOL1	WCOL2	MTRANS1A	MTRANS2A	WHITE	NTRIP	WLC
IBART	1.00000	0.23766	-0.09777	0.08354	0.06188	0.05100	0.0	0.45371	0.33572	-0.12410	0.22608	0.12256
CBD1	0.23766	1.00000	-0.13090	0.07801	-0.01022	0.05870	0.12103	0.45903	0.34793	-0.12154	0.22384	-0.12319
CBD2	-0.09777	-0.13090	1.00000	0.09436	0.00855	-0.03836	0.65482	-0.01202	-0.06655	-0.17143	-0.02113	-0.16676
AGE	0.08354	0.07801	0.09436	1.00000	0.16648	0.17664	0.01112	0.10036	-0.07648	0.09432	0.10674	0.11669
Y1	0.06188	-0.01022	0.00855	0.16648	1.00000	0.34327	-0.06599	0.00280	0.19228	0.26255	0.16188	0.44201
WCOL1	0.05100	0.05870	-0.03836	0.17664	0.34327	1.00000	-0.49334	0.02579	0.08139	0.09275	0.11963	0.29056
WCOL2	0.0	0.12103	0.65482	0.01112	-0.06599	-0.49334	1.00000	0.02868	-0.05440	0.07416	0.04293	-0.07201
MTRANS1A	0.45371	0.45903	-0.01202	0.10036	0.00280	0.02579	0.02868	1.00000	0.32140	0.01571	0.30840	0.06185
MTRANS2A	0.33572	0.34793	-0.06655	-0.07648	0.19228	0.08139	-0.05440	0.32140	1.00000	-0.04079	0.10562	0.24631
WHITE	-0.02410	-0.02108	-0.17143	0.09432	0.26255	0.09275	0.07416	0.01571	-0.04079	1.00000	0.00030	0.26146
NTRIP	0.22608	0.22384	-0.02113	0.10674	0.16188	0.11963	-0.04293	0.30840	0.10562	0.00030	1.00000	0.30402
WLC	0.12256	-0.12319	-0.06676	0.11869	0.44201	0.29056	-0.07201	0.06185	0.24631	0.26146	0.30402	1.00000
MS	-0.05777	0.25669	-0.16343	-0.08484	-0.44333	-0.16469	0.07476	-0.01159	-0.19378	-0.13109	-0.21678	-0.72470
WPOTH	0.00840	0.36878	0.11750	0.01532	0.01230	0.02627	0.03402	0.22107	0.09994	-0.12370	-0.09798	0.01979
HHCOMP1	0.07308	-0.01070	0.07995	0.04694	0.32285	0.09318	-0.03596	0.03029	0.06055	-0.14520	0.21451	0.16295
HHCOMP2	0.04538	-0.09807	-0.09410	0.07619	0.17182	0.14320	-0.10195	0.03587	0.10127	0.13896	0.11955	0.21247
HHCOMP3	-0.04543	0.02229	0.08474	-0.03383	-0.10635	0.06690	0.02432	-0.03358	0.01141	-0.18667	-0.10749	-0.05392
HHCOMP4	-0.04292	0.11038	-0.00596	0.11790	-0.30336	-0.12985	0.16723	0.02342	-0.08582	-0.03861	-0.12134	-0.26907

	MS	WPOTH	HHCOMP1	HHCOMP2	HHCOMP3	HHCOMP4
IBART	-0.05777	0.00840	0.07308	0.04538	-0.04543	-0.04292
CBD1	0.25669	0.36878	-0.01070	-0.09807	0.02229	0.11038
CBD2	-0.16343	0.11750	0.07995	-0.09410	0.08474	-0.00596
AGE	-0.08484	0.01532	0.04694	0.07619	-0.03383	0.11790
Y1	-0.44333	0.00230	0.32285	0.17182	-0.10635	-0.30336
WCOL1	-0.16469	0.02627	0.09318	0.14320	0.06690	-0.12985
WCOL2	0.07476	0.03402	-0.03586	-0.10195	0.02432	0.16723
MTRANS1A	-0.01159	0.22107	0.03029	0.03587	-0.03358	0.02342
MTRANS2A	-0.19378	0.09994	0.06055	0.10127	0.01141	-0.08582
WHITE	-0.13199	-0.02370	-0.14520	0.13896	-0.18667	-0.03861
NTRIP	-0.21678	-0.09798	0.21451	0.11195	-0.10749	-0.12134
WLC	-0.72470	0.21979	0.16295	0.21247	-0.05392	-0.26907
MS	1.00000	0.08735	-0.27006	-0.18800	0.02492	0.30404
WPOTH	0.08735	1.00000	-0.06680	-0.11195	0.07446	0.10013
HHCOMP1	-0.27006	-0.06380	1.00000	-0.36251	-0.18201	-0.33374
HHCOMP2	-0.18800	-0.11195	-0.36251	1.00000	-0.10734	-0.19683
HHCOMP3	0.02492	0.07446	-0.18201	-0.10734	1.00000	-0.09882
HHCOMP4	0.30404	0.10013	-0.33374	-0.19683	-0.09882	1.00000

All Movers (Without Mode of Transportation)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. IBART

VARIABLE(S) ENTERED ON STEP NUMBER 14.. HHCOMP4

MULTIPLE R	0.45746	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.20927	REGRESSION	14.	8.67034	0.61931	4.1021c
ADJUSTED R SQUARE	0.15826	RESIDUAL	217.	32.76070	0.15097	
STANDARD ERROR	0.38855					

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
NTRIP	0.46756560-02	0.20485	0.00170	7.538
CBD1	0.2453858	0.27253	0.06961	12.426
WLC	0.95789090-01	0.11299	0.09389	1.041
WCOL1	0.62822200-01	0.07411	0.06755	0.865
CBD2	0.83641410-01	0.04206	0.13244	0.399
AGE	0.23939460-02	0.05740	0.00279	0.738
HHCOMP1	0.28812400-01	0.03376	0.07496	0.148
Y1	-0.13358430-02	-0.03786	0.00287	0.216
MS	-0.36375470-01	-0.04079	0.09471	0.148
WPOTH	-0.20743780-01	-0.02149	0.06992	0.088
WHITE	-0.22396790-01	-0.02022	0.07450	0.090
HHCOMP2	-0.20064160-01	-0.01877	0.08537	0.055
WCOL2	0.16795220-01	0.01558	0.06049	0.044
HHCOMP4	-0.11241900-01	-0.00893	0.09165	0.015
(CONSTANT)	-0.98836570-01			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HHCOMP3	-0.00530	-0.00520	0.76151	0.006

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

All Movers (With Mode of Transportation)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. IBART

VARIABLE(S) ENTERED ON STEP NUMBER 15.. WCOL1

MULTIPLE R	0.52787	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.27865	REGRESSION	15.	7.47131	0.49809	4.12065
ADJUSTED R SQUARE	0.21102	RESIDUAL	160.	19.34119	0.12088	
STANDARD ERROR	0.34768					

---------- VARIABLES IN THE EQUATION ----------

VARIABLE	B	BETA	STD ERROR B	F
MTRANS1A	0.1220669	0.34806	0.02924	17.432
MTRANS2A	0.9519035D-01	0.21599	0.03319	8.214
WPOTH	-0.9448636D-01	-0.10482	0.06957	1.844
CB01	0.6558044D-01	0.07622	0.07616	0.742
NTRIP	0.1138181D-02	0.06794	0.04166	0.373
CB02	-0.1398495	-0.07002	0.14376	0.946
AGE	0.2777039D-02	0.06857	0.00292	0.904
WHITE	-0.5597332D-01	-0.05956	0.06982	0.643
HHCOMP4	-0.4142600D-01	-0.03825	0.08274	0.251
HHCOMP3	-0.6353727D-01	-0.03416	0.12626	0.230
WLC	0.2426845D-01	0.03967	0.06824	0.124
HHCOMP2	-0.1767641D-01	-0.01725	0.07323	0.058
WCOL2	0.1826557D-01	0.01805	0.08309	0.048
Y1	-0.4035554D-03	-0.01106	0.00305	0.018
WCOL1	0.8827123D-02	0.01130	0.06649	0.017
(CONSTANT)	0.7734359D-01			

---------- VARIABLES NOT IN THE EQUATION ----------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
MS	-0.00124	-0.00089	0.37320	0.000
HHCOMP1	0.00012	0.00010	0.48610	0.000

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

CORRELATION COEFFICIENTS

Walnut Creek Movers

	IBART	CBD1	CBD2	AGE	Y1	WCOL1	WCOL2	MTRANS1A	MTRANS2A	WHITE	NTRIP	WPOTH
IBART	1.00000	0.54165	-0.09069	0.01087	0.08417	0.06449	0.00940	0.60076	0.43690	-0.10563	0.35282	0.10877
CBD1	0.54165	1.00000	-0.08755	0.26222	0.12008	0.17495	-0.06173	0.70245	0.30112	-0.21780	0.55903	0.30568
CBD2	-0.09069	-0.08755	1.00000	0.02856	0.04078	-0.06360	0.15631	-0.08122	-0.07480	0.05410	0.03586	0.09069
AGE	0.01087	0.26222	0.02856	1.00000	0.11411	0.16517	0.09262	0.07355	-0.19950	0.10834	0.04371	0.12239
Y1	0.08417	0.12008	0.04078	0.11411	1.00000	0.12789	0.08510	0.07919	0.14284	-0.02459	-0.01917	0.03366
WCOL1	0.06449	0.17495	-0.06360	0.16517	0.12789	1.00000	-0.62199	0.07201	0.10195	-0.04796	0.00639	-0.00081
WCOL2	0.00940	-0.06173	0.15631	0.09262	0.08510	-0.62199	1.00000	-0.12552	-0.01169	0.02516	-0.07465	-0.00940
MTRANS1A	0.60076	0.70245	-0.08122	0.07355	0.07919	0.07201	-0.12552	1.00000	0.42600	-0.03965	0.47814	0.20989
MTRANS2A	0.43690	0.30112	-0.07480	-0.19950	0.14284	0.10195	-0.01169	0.42600	1.00000	-0.06398	0.08387	0.10604
WHITE	-0.10563	-0.21780	0.05410	0.10834	-0.02459	-0.04796	0.02516	-0.03965	-0.06398	1.00000	-0.24986	0.00746
NTRIP	0.35282	0.55903	0.03586	0.04371	-0.01917	0.00639	-0.07465	0.47814	0.08387	-0.24986	1.00000	-0.08661
WPOTH	0.10877	0.30568	0.09069	0.12239	0.03366	-0.00081	-0.00940	0.20989	0.10604	0.00746	-0.08661	1.00000
HHCOMP1	0.12472	0.27636	0.17171	0.11558	0.27681	0.14775	0.02684	0.15820	-0.03700	-0.10537	0.25268	0.11270
HHCOMP2	-0.00339	-0.05361	-0.09698	0.10662	0.09318	0.16299	-0.09499	0.05325	0.09593	0.01202	0.08512	-0.13069
HHCOMP3	-0.11180	-0.10793	-0.03202	0.00210	-0.01005	0.13518	-0.08408	-0.10013	0.06123	-0.15283	-0.17417	-0.04315
HHCOMP4	-0.11180	-0.10793	-0.03202	0.03520	-0.22590	-0.29200	0.28495	-0.10013	-0.09221	0.06669	-0.03328	0.11180

	HHCOMP1	HHCOMP2	HHCOMP3	HHCOMP4
IBART	0.12472	-0.00339	-0.11180	-0.11180
CBD1	0.27636	-0.05361	-0.10793	-0.10793
CBD2	0.17171	-0.09698	-0.03202	-0.03202
AGE	0.11558	0.10662	0.00210	0.03520
Y1	0.27681	0.09318	-0.01005	-0.22590
WCOL1	0.14775	0.16299	0.13518	-0.29200
WCOL2	0.02684	-0.09499	-0.08408	0.28495
MTRANS1A	0.15820	0.05325	-0.10013	-0.10013
MTRANS2A	-0.03700	0.09593	0.06123	-0.09221
WHITE	-0.10537	0.01202	-0.15283	0.06669
NTRIP	0.25268	0.08512	-0.17417	-0.03328
WPOTH	0.11270	-0.13069	-0.04315	0.11180
HHCOMP1	1.00000	-0.56477	-0.18648	-0.18648
HHCOMP2	-0.56477	1.00000	-0.11955	-0.11955
HHCOMP3	-0.18648	-0.11955	1.00000	-0.03947
HHCOMP4	-0.18648	-0.11955	-0.03947	1.00000

Walnut Creek Movers (Without Mode of Transportation)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. IBART

VARIABLE(S) ENTERED ON STEP NUMBER 13.. WPOTH

MULTIPLE R	0.64640	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.41784	REGRESSION	13.	11.36512	0.87424	6.12628
ADJUSTED R SQUARE	0.34965	RESIDUAL	111.	15.83488	0.14266	
STANDARD ERROR	0.37770					

VARIABLES IN THE EQUATION

VARIABLE	b	BETA	STD ERROR B	F
CBD1	0.4703677	0.46382	0.11068	18.061
NTRIP	0.73313068-02	0.39701	0.00241	9.289
CBD2	0.2270248C	0.12384	0.17661	2.341
WCOL1	0.3181157	0.31596	0.11234	8.019
WCOL2	0.2910443	0.23326	0.13316	4.777
AGE	-0.43999310-02	-0.09665	0.00377	1.364
WHITE	0.98242866-01	0.05155	0.14559	0.455
HHCOMP1	-0.2617939	-0.25817	0.13412	3.250
HHCOMP2	-0.2433037	-0.22763	0.14065	2.992
HHCOMP4	-0.1702E112	-0.07176	0.20643	0.685
HHCOMP3	-0.1716631	-0.06477	0.23139	0.552
Y1	0.15447100-02	0.03734	0.00344	0.202
WPOTH	0.14643910-01	0.01384	0.09552	0.024
(CONSTANT)	-0.1502732			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

MAXIMUM STEP REACHED

Walnut Creek Movers (With Mode of Transporation)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. IBART

VARIABLE(S) ENTERED ON STEP NUMBER 14.. Y1

MULTIPLE R	0.67770	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.45928	REGRESSION	14.	6.62764	0.47340	3.88297
ADJUSTED R SQUARE	0.34100	RESIDUAL	64.	7.80274	0.12192	
STANDARD ERROR	0.34917					

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
MTRANS1A	0.1346938	0.37997	0.05219	6.662
MTRANS2A	0.8200079D-01	0.21979	0.03965	4.276
CBD1	0.1443157	0.14163	0.16905	0.729
HHCOMP3	-0.2694499	-0.12050	0.23919	1.269
WCOL2	0.1931770	0.16223	0.16085	1.442
WPOTH	-0.2363441D-01	-0.02363	0.10775	0.048
HHCOMP4	-0.2911122	-0.08990	0.23907	0.707
HHCOMP2	-0.1599894	-0.16537	0.14639	1.194
HHCOMP1	-0.1238293	-0.14458	0.14379	0.774
WCOL1	0.1119282	0.12180	0.13268	0.712
NTRIP	0.2297096D-02	0.10106	0.00317	0.525
CBD2	-0.1261751	-0.04637	0.26630	0.224
WHITE	-0.5842263D-01	-0.04128	0.14234	0.169
Y1	0.5778556D-03	0.01410	0.00439	0.017
(CONSTANT)	0.8012262D-01			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
AGE	-0.00763	-0.00847	0.66659	0.005

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION